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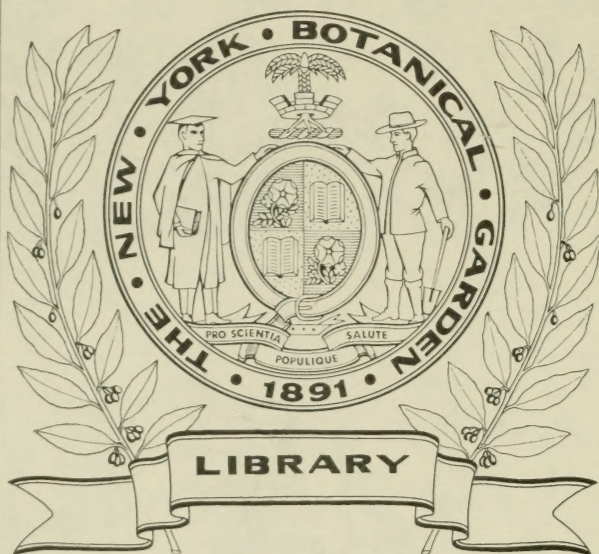
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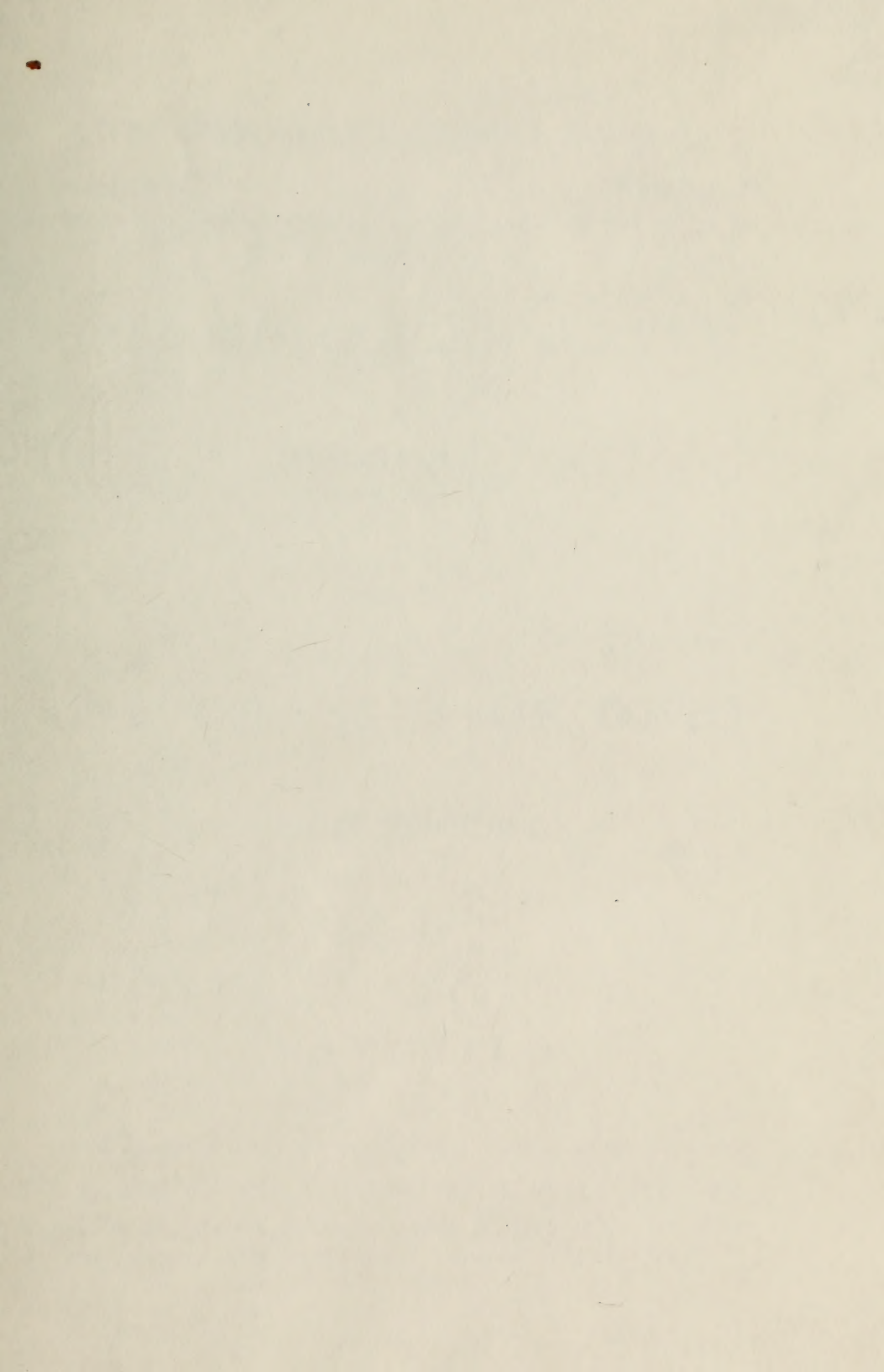
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The Ohio State University Bulletin

Volume XXI

Number 28

OHIO BIOLOGICAL SURVEY

BULLETIN 9

VOLUME II, No. 5

THE GRASSES OF OHIO

John H. Schaffner

MAY 1917

PUBLISHED BY THE UNIVERSITY AT COLUMBUS, OHIO

Entered as second-class matter November 17, 1905, at the Postoffice,
at Columbus, Ohio, under Act of Congress, July 16, 1894.

OHIO BIOLOGICAL SURVEY

HERBERT OSBORN, Director

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Volume II. No. 5

Bulletin No. 9

OHIO BIOLOGICAL SURVEY

THE GRASSES OF OHIO

John H. Schaffner

Published by
THE OHIO STATE UNIVERSITY
Columbus
1917

Contribution from the Department of Botany,
Ohio State University 98.

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INTRODUCTION

The grasses of our state, including both wild and cultivated species, may properly be regarded as our most important vegetation; for no other plants have such a wide and fundamental bearing on the stability and progress of our prosperity and civilization. There are about 4500 species of true grass plants known in the world. Of these about 180 species occur as native, introduced, or commonly cultivated in Ohio.

The grasses, outside of the bamboo tribe, are all herbaceous, perennials, biennals or annuals. The stem, sometimes called the culm, is of a very extreme type having exceedingly long internodes. It is either hollow or solid, but if hollow it is always closed at the nodes. The leaves are two-ranked and alternate. The leaf is also a highly specialized structure usually having a linear blade with a more or less prominent midrib and a large sheath which is open on the side opposite the blade. On the upper side of the leaf between the sheath and the blade there is often a permanent fringe of hairs or one or more scarious appendages called ligules. The roots of grasses are fibrous and together with the creeping rootstocks form the sod so characteristic of many species.

Grasses are very generally distributed throughout the world, often forming extensive prairies, meadows, or plains, and furnishing great quantities of food for grazing animals. They are of importance in making an effective covering for large areas of the earth's surface and in protecting the land from erosion. The grasses yielding food grains are called cereals and constitute the most substantial food plants for man. The most important of these grasses are Indian corn, rice, wheat, rye, barley, oats, sorghum, millet and sugar cane.

Aside from the general uses mentioned above certain species of grasses are employed in many other ways. Various species furnish material for basketry and for hats, mats, and braidwork; many species are used in paper making; some furnish various commercial starches, oils and cellulose used in the arts; some are used for fuel as for instance the cobs of Indian corn; certain species are used as soil binders on levees, in river bottoms, and on sand dunes; species belonging to the bamboo tribe are used extensively for building houses and fences, for furniture, fishing poles, and an endless assortment of small articles; various species like rye are used for thatching roofs; broom corn, a variety of sorghum, is used extensively in the manufacture of brooms and brushes; the peculiar fruits of job's-tears are strung as beads; corn cobs are manufactured into tobacco pipes; some species are used in medicine; various species are cultivated as ornamental grasses in gardens and the panicles of some are employed for dry winter bouquets. Many other uses might be mentioned.

Grasses, of course, belong to the flowering plants, or *Anthophyta*. They are classified botanically as follows:

Phylum, *Anthophyta*, flowering plants. Seed plants of diverse habit and commonly with showy flowers on the sporophyte, with closed carpels or carpel sets, with female gametophytes of eight or rarely sixteen, or a smaller number of cells, usually containing two, or rarely more, polar nuclei which conjugate with each other and with one of the two nonmotile sperms from the male gametophyte or pollengrain, which is deposited on a stigma and develops a long pollentube. As the result of this triple fusion a new tissue is produced of greater or less extent surrounding the developing embryo in the ovule. This peculiar endosperm is called the xenophyte generation and it is the presence of this tissue, especially, in many grains of grasses that gives them their great food value.

The grasses belong to the class *Monocotylae*, or monocotyls, which may be defined as having the following characteristics:

Sporophytes developing as herbs or sometimes as woody plants of large dimensions; embryo usually with one terminal cotyledon and a lateral plumule; stem with closed, usually scattered vascular bundles, without typical bark and annual rings of growth, rarely with secondary thickening; leaves mostly parallel-veined, sometimes netted-veined; flowers more commonly trimerous, the ideal being a trimerous, pentacyclic flower with united carpels.

The Monocotyls are divided into four subclasses, the grasses falling into the subclass, *Glumiflorae*:

Glumiflorae (Glume-flowered Monocotyls). Usually grass-like herbs or sometimes woody plants with hypogynous, inconspicuous flowers. Carpels united; stigmas 3-1; perianth usually of 6-2 minute segments or bristles or entirely wanting; inflorescence usually consisting of spikes or spikelets variously clustered; endosperm mealy, starchy or rarely sugary.

The order of the *Glumiflorae* to which the grasses belong is commonly called *Graminales* and is characterized by its unilocular ovulary containing one anatropous, erect or ascending ovule.

There are two families of *Graminales*, *Cyperaceae* or Sedges and *Graminaceae* or Grasses. In general the sedges constitute the lower and less specialized group.

Graminaceae. Grass Family

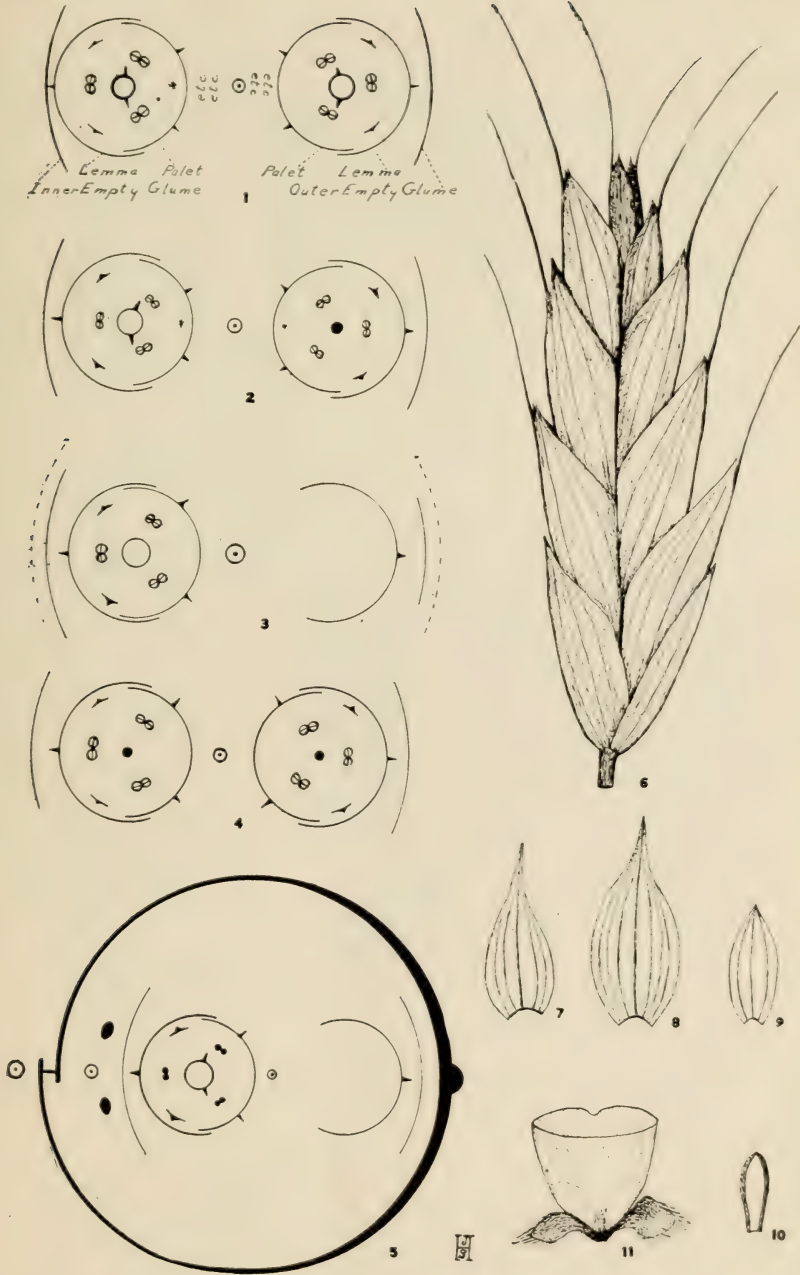
Highly specialized, perennial, geophilous herbs or annuals, or sometimes woody plants, with hollow or occasionally solid stems, having prominent internodes, the nodes closed. Leaves 2-ranked, with sheaths, the sheaths usually split to the base; upper end of the sheath usually with one or two ligules; sometimes with a short petiole between the sheath and the blade, in which a cleavage plane is developed. Inflorescence a panicle, raceme, or spike, composed of spikelets. Spikelets and flowers with 2-ranked glumes, each spikelet normally with two empty glumes at its base and each flower normally with two flowering glumes, the outer one called the lemma, the inner the palea. Flowers bisporangiate or monosporangiate, monoecious or dioecious with all intermediate gradations, often completely vestigial. Perianth of 3 usually 2 small bracts called lodicules which probably represent a corolla or inner perianth cycle; stamens of the andrecium 6, or usually 3, sometimes reduced to 2 or 1; anthers versatile, with 4 microsporangia; gynecium highly specialized, consisting of 3 united carpels forming a unilocular ovulary with one ovule; stigmas 3, 2 or 1, usually 2, hairy or plumose. Fruit a dry seed-like grain (caryopsis), or in the lower forms sometimes fleshy; endosperm starchy or rarely sugary.

TERMINOLOGY OF THE GRASS INFLORESCENCE

The inflorescence of a grass is made up of compact flower-bearing branchlets known as spikelets. In general, the spikelet of a grass is of the same importance in identification as the flower in most other groups. The spikelet usually has two bracts at the base which are called the *empty glumes*. These may be distinguished as the *outer* and *inner empty glumes*, or the *lower* and *upper empty glumes*. Each flower is also normally inclosed in two bracts, called the *flowering glumes*. The outer of these glumes is called the *lemma*, the inner the *palet*. All of these bracts can thus be called *glumes* collectively. Through reduction of the spikelet and degeneration of the flower, part of the glumes may be absent or vestigial, or extra glumes may be present. Usually there are 2 (sometimes 3) minute bracts or scales at the base of the flower, within the flowering glumes. These are called *lodicules* and are supposed to represent a vestigial perianth. The axis of the spikelet is called a rachilla and if the inflorescence is a spike, its main axis is called a rachis.

EXPLANATION OF PLATE XI

- Fig. 1. Diagram of spikelet of *Bromus* sp.
- Fig. 2. Diagram of spikelet of *Panicum virgatum*. The staminate flower has a vestigial gynecium.
- Fig. 3. Diagram of spikelet of *Chaetochloa viridis*. The vestigial flower consists only of a lemma. There are bristles at the base of the spikelet.
- Fig. 4. Diagram of staminate spikelet of *Coix lacryma-jobi*. Each of the two flowers has a vestigial gynecium.
- Fig. 5. Diagram of carpellate spikelet of *Coix lacryma-jobi*, enclosed in a modified bony leaf sheath. The spikelet contains a vestigial lemma and a carpellate flower with three vestigial stamens; also two vestigial structures marked as oval black spots.
- Fig. 6. Spikelet of *Bromus racemosus* showing the two empty glumes and nine flowers.
- Fig. 7. Lower or outer empty glume of *Panicum virgatum*.
- Fig. 8. Inner or upper empty glume of *Panicum virgatum*.
- Fig. 9. Lemma of *Eragrostis major*.
- Fig. 10. Palet of *Eragrostis major*.
- Fig. 11. The two lodicules (vestigial perianth segments) at the base of the grain of *Triticum aestivum*.



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PLATE XII

Representative stages in the evolution of the grass inflorescence.

Fig. 1. Inflorescence of *Arundinaria macrosperma* Mx.Fig. 2. Panicle of *Uniola paniculata* L.Fig. 3. Spike-like panicle of *Pennisetum glaucum* (L.) R.Br.Fig. 4. Carpellate inflorescence (ear with husks) of *Zea mays* L.

SYNOPSIS OF THE TRIBES OF GRASSES

I. Spikelets many-1-flowered; rachilla usually articulated above the empty glumes which are persistent after the fall of the flowers; spikelets usually more or less laterally compressed.

1. Aerial stems entirely woody or at least woody at the base, perennial; lodicules (perianth segments) often 3; leaf-blade with a short petiole articulated with the sheath.

Subfamily, **Bambusatae**.

a. Tribe, *Bambuseae*.

2. Aerial stems herbaceous and annual; lodicules usually 2; leaf-blades sessile, without a joint.

Subfamily, **Poacatae**.

- (1). Spikelets 2-many-flowered, rarely with 1 perfect and 1 staminate flower; in panicles, spike-like panicles or racemes.

- a. Flowering glumes as long or longer than the empty glumes, unawned or with a straight awn from the apex.

Tribe, *Festuceae*.

- b. Flowering glumes generally shorter than the empty glumes, usually with a bent awn on the back; callus and usually the rachilla-joints hairy.

Tribe, *Aveneae*.

- (2). Spikelets 1-several-flowered, in rows, forming an equilateral or 1-sided spike or raceme; sometimes monosporangiate.

- a. Spikelets sessile in 2 opposite rows, forming an equilateral spike; leaf-blades bearing at base a more or less well-marked pair of auriculate appendages.

Tribe, *Hordeae*.

- b. Spikelets sessile in 2 rows on one side of a flattened axis, forming 1-sided spikes which are digitate or paniculate, or sometimes solitary.

Tribe, *Chlorideae*.

- (3). Spikelets with but one perfect flower, sometimes with additional monosporangiate flowers; always in panicles or racemes, not in rows.

- a. Empty glumes 2, the third glume (lemma) enclosing a perfect flower just above the empty glumes; palea of the perfect flower usually 2-nerved.

Tribe, *Agrostideae*.

- b. With 2 minute glumes (lemmas) above the 2 normal empty glumes or sometimes with 2 staminate flowers, the perfect flower on the top of the spikelet; palea of the perfect flower usually 1-nerved or nerveless.

Tribe, *Phalarideae*.

II. Spikelets usually 2-flowered or by degeneration 1-flowered; rachilla articulated below the empty glumes which are thus deciduous with the flowers; spikelets usually more or less dorsally compressed; aerial stems annual.

Subfamily, **Panicatae**.

1. Flowering glumes, at least of the perfect flowers, similar in texture to the empty glumes, or frequently coriaceous or chartaceous (indurated), never thin and hyaline.

- (1). Spikelets with 4 or more glumes, more or less dorsally compressed.

- a. Flowering glumes of the perfect flowers chartaceous or coriaceous, very different from the empty glumes.

Tribe, *Panicaceae*.

- b. Flowering glumes membranous.
 - (a). Inflorescence paniculate, spikelets deciduous singly from the ultimate branches; first empty glume usually smaller and narrower than the rest. Tribe, *Tristegineae*.
 - (b). Inflorescence spicate; spikelets deciduous singly or in groups; first empty glume usually larger than the rest, the second one often spiny. Tribe, *Zoysiae*.
- (2). Spikelets laterally compressed, with but 2 normal glumes, the empty glumes reduced or wanting; spikelets often monosporangiate. Tribe, *Oryzae*.
- 2. Flowering glumes thin and hyaline, much more delicate in structure than the thick-membranous or coriaceous empty glumes.
 - a. Spikelets in pairs, one usually sessile the other pedicellate, the sessile spikelet with a perfect flower, the pedicellate one with a perfect, staminate, or sterile (vestigial) flower; lemmas of the perfect flowers usually awned. Tribe, *Andropogoneae*.
 - b. Spikelets monosporangiate, in separate inflorescences or in different parts of the same inflorescence, the carpellate portion or inflorescence below, the staminate above; lemmas awnless. Tribe, *Maydeae*.

SYNOPSIS OF THE GENERA IN EACH TRIBE

The number after the generic name refers to the list number.

Festuceae.

- I. Rachilla and flowering glumes glabrous or with hairs shorter than the glumes.
 - A. Spikelets all alike.
 - 1. Lemmas 5-many-nerved.
 - (1). Spikelets not in dense 1-sided clusters.
 - ((1)). Stigmas arising below a cushion-like appendage at the tip of the ovulary. *Bromus*. (1)
 - ((2)). Stigmas arising at or near the tip of the ovulary.
 - a. Spikelets with 2 or more of the upper glumes empty, broad, and enfolding each other. *Melica*. (2)
 - b. Spikelets with the upper glumes flower-bearing, or if empty similar in shape to the other glumes.
 - (a). Lemmas rounded on the back; at least below.
 - ((a)). Lemma acute, pointed or awned at apex, its nerves not prominent. *Festuca*. (3)
 - ((b)). Lemma obtuse or subacute at the apex, usually toothed, its nerves prominent. *Panicularia*. (4)
 - (b). Lemmas more or less strongly compressed and keeled. *Poa*. (5)
 - (2). Spikelets nearly sessile in dense 1-sided clusters. *Dactylis*. (6)
 - 2. Lemmas 1-3-nerved, rarely with faint additional nerves.
 - (1). Callus and nerves of the lemma glabrous or cobwebby, or the callus sparingly bearded.

- ((1)). Lemma not coriaceous in fruit; grain beakless, not exerted.
- a. Rachilla not prolonged behind the palet of the uppermost sterile flower; spikelets in an open panicle.
Eragrostis. (7)
- b. Rachilla prolonged behind the palet of the uppermost flower; spikelets 2-5-flowered, usually in a more or less contracted panicle.
- (a). Inner empty glume broad and rounded at the tip; very dissimilar from the outer glume.
Sphenopholis. (8)
- (b). Inner empty glume similar to the outer.
Koeleria. (9)
- ((2)). Lemma coriaceous in fruit, grain beaked and exerted.
Korycarpus. (10)
- (2). Callus and nerves of the lemma densely bearded, not cobwebby.
- ((1)). Palet not ciliate-fringed; internodes of the rachilla short.
Tridens. (11)
- ((2)). Palet conspicuously ciliate-fringed; internodes of the rachilla long.
Triplasis. (12)
- B. Spikelets of 2 kinds, in small clusters, the upper perfect ones surrounded by sterile spikelets below.
Cynosurus. (13)
- II. Rachilla with hairs longer than the flowering glumes.
Phragmites. (14)

Aveneae.

- I. Spikelets not deciduous, the empty glumes persistent.
- A. Spikelets 2-many-flowered; rachilla prolonged beyond the upper glume.
1. Awn projecting from between the lobes of the lemma, flattened and twisted.
Danthonia. (15)
2. Awn of the lemma dorsal, not flattened.
- (1). Spikelets 2-flowered, the upper bisporangiate, the lower staminate and its glumes strongly awned.
Arrhenatherum. (16)
- (2). Spikelets 2-several-flowered; flowers all bisporangiate or the uppermost imperfect.
- a. Lemma keeled; awn rising from above the middle; spikelets less than $\frac{1}{2}$ inch long.
Trisetum. (17)
- b. Lemma rounded on the back.
- (a). Spikelets over $\frac{1}{2}$ in. long; grain furrowed, usually adherent to the flowering glumes.
Avena. (18)
- (b). Spikelets less than $\frac{1}{2}$ in. long; grain not furrowed, free.
Deschampsia. (19)
- B. Spikelets with 2 bisporangiate flowers; rachilla not prolonged beyond the upper flower.
Aspris. (20)
- II. Spikelets deciduous; lower flower bisporangiate, upper staminate with a hook-like awn; plant velvety.
Nothololcus. (21)

Hordeae.

1. Spikelets solitary at each joint of the rachis.
 1. Spikelets with their backs or edges to the rachis. *Lolium.* (22)
 2. Spikelets with their sides to the rachis.
 - a. Empty glumes 3-many-nerved.
 - (a). Empty glumes lanceolate or linear; spikelets 3-many-flowered. *Agropyron.* (23)
 - (b). Empty glumes ovate; spikelets 2-6-flowered. *Triticum.* (24)
 - b. Empty glumes 1-nerved, subulate; spikelets with 2 perfect flowers. *Secale.* (25)
- II. Spikelets 2-6 at each joint of the rachis, some of them may be reduced.
 1. Spikelets 2-many-flowered.
 - a. Empty glumes but little smaller than the flowering glumes. *Elymus.* (26)
 - b. Empty glumes very small or none; spikelets in pairs. *Hystrix.* (27)
 2. Spikelets 1-flowered or with a vestigial second flower; in threes at each joint of the rachis. *Hordeum.* (28)

Chlorideae.

- I. Spikelets 1-flowered, with no vestigial lemma.
 1. Spikelets articulated below the empty glumes.
 - a. Rachis extending beyond the upper spikelet; spikelets lanceolate. *Spartina.* (29)
 - b. Rachis of the spikes not produced; spikelets orbicular *Beckmannia.* (30)
 2. Spikelets articulated above the empty glumes; spikes digitate. *Capriola.* (31)
- II. Spikelets with two or more flowers.
 1. With 2-several perfect flowers in each spikelet; spikes usually digitate. *Eleusine.* (32)
 2. With 1 perfect flower in each spikelet; spikes solitary or racemose.
 - a. Spikes numerous, each with 12 or less spikelets. *Atheropogon.* (33)
 - b. Spikes 4 or less, each with 25 or more spikelets. *Bouteloua.* (34)

Agrostideae.

- I. Flowering glumes membranous, not firmer than the empty glumes.
 - A. Lemma awnless or with a dorsal awn; flowering glumes loosely enclosing the grain.
 1. Empty glumes not conspicuously compressed; spikelets usually in open or narrow panicles.
 - (1). Lemma 1-nerved, awnless. *Sporobolus.* (35)
 - (2). Lemma 3-5-nerved.

((1)). Panicle open; lemma usually awned.

a. Flowers not stalked; stamens 3; palet 2-nerved.

(a). Lemma entire; rachilla not prolonged, or if so with a tuft of long hairs.

((a)). Callus below the flowering glumes and the prolonged rachilla with a tuft of long hairs. *Calamagrostis*. (36)

((b)). Callus naked or with short hairs; rachilla not prolonged. *Agrostis*. (37)

(b). Lemma long-awned, with a bifid apex; rachilla prolonged into a short bristle. *Apera*. (38)

b. Flowers plainly stalked; stamen 1, palet usually 1-nerved. *Cinna*. (39)

((2)). Panicle narrow and contracted; lemma awnless. *Ammophila*. (40)

2. Empty glumes conspicuously compressed-carinate; spikelets in dense spike-like panicles.

(1). Empty glumes awnless.

((1)). Lemma awned below the middle; panicle exserted, cylindrical. *Alopecurus*. (41)

((2)). Lemma awnless; panicle partly included, ovoid. *Heleochloa*. (42)

(2). Empty glumes awned; lemma awnless. *Phleum*. (43)

B. Lemma with a terminal awn or awn-pointed; flowering glumes closely enclosing the grain.

1. Rachilla not prolonged behind the palet; empty glumes usually evident. *Muhlenbergia*. (44)

2. Rachilla extending beyond the base of the palet into a bristle; empty glumes minute. *Brachyelytrum*. (45)

II. Flowering glumes indurated at maturity, firmer than the empty glumes.

A. Lemmas awnless, their margins inrolled; spikelets without a basal callus. *Milium*. (46)

B. Lemmas awned, their margins flat; spikelets with a basal callus.

1. Awn simple.

(1). Lemma broad, its awn straight and deciduous. *Oryzopsis*. (47)

(2). Lemma narrow, its awn twisted and persistent. *Stipa*. (48)

2. Awn 3-branched; callus acute. *Aristida*. (49)

Phalarideae.

1. Empty glumes equal or nearly so.

a. Third and fourth glumes (lemmas) subtending staminate flowers. *Savastana*. (50)

b. Third and fourth glumes small and empty, or vestigial. *Phalaris*. (51)

2. Empty glumes very unequal; third and fourth glumes dorsally awned. *Anthoxanthum*. (52)

Paniceae.**I. Spikelets without a subtending involucre.**

1. Spikelets arranged in true panicles. *Panicum.* (53)
2. Spikelets arranged in 1-sided recemes, sometimes paniculate.
 - (1). Fruiting flowering glumes chartaceous, with flat hyaline margins.
 - a. Spikelets long-pediceled, in a diffuse panicle. *Leptoloma.* (54)
 - b. Spikelets on slender spike-like, often digitate branches of the inflorescence. *Syntherisma.* (55)
 - (2). Fruiting flowering glumes indurated, rigid, the margins inrolled, not hyaline.
 - a. Some of the glumes awned; spikelets crowded in 1-sided branches of the panicle. *Echinochloa.* (56)
 - b. Glumes awnless; spikelets plano-convex, on secund branches of the inflorescence. *Paspalum.* (57)

II. Spikelets with an involucre of bristles or a prickly bur.

1. Spikelets subtended by bristles. *Chaetochloa.* (58)
2. Spikelets enclosed in a globular, prickly, bur-like involucre. *Cenchrus.* (59)

Oryzeae.

1. Spikelets much flattened laterally, with bisporangiate flowers. *Homalocenchrus.* (60)
2. Spikelets monosporangiate.
 - a. Spikelets intermixed in the panicle. *Zizaniopsis.*
 - b. With carpellate spikelets in the upper part of the panicle and staminate spikelets below. *Zizania.* (61)

Andropogoneae.

1. Inflorescence paniculate, decompound.
 - a. Pedicellate spikelet present; stem solid. *Holcus.* (62)
 - b. Pedicellate spikelet wanting; stem hollow. *Sorghastrum.* (63)
2. Inflorescence simple or compound made up of 1 or more spike-like racemose branches.
 - a. Spikelets alike, all with bisporangiate flowers; rachis of the inflorescence branches continuous. *Miscanthus.* (64)
 - b. Sessile spikelets bisporangiate, with awns, the pedicellate spikelets staminate or empty; inflorescence simple or with 6 or less digitate branches. *Andropogon.* (65)

Maydeae.

1. Carpellate spikelets inclosed in pockets of the internodes of the enlarged and flattened rachis; rachis breaking into joints at maturity; inflorescence staminate above, carpellate below.
 - a. Carpellate inflorescence not covered with husks. *Tripsacum.* (66)
 - b. Carpellate inflorescence covered with husks. *Euchlaena.*
2. Carpellate spikelets covered by a bony leaf-sheath or collected in an ear covered with husks.
 - a. With a bony leaf-sheath covering the single large grain. *Coix.* (67)
 - b. With numerous grains in an ear covered with husks, or with husk-like glumes around the grains. *Zea.* (68)

KEY TO THE GENERA OF OHIO GRASSES.

The number after the generic name refers to the list number.

1. Spikelets in panicles or racemes, or in spike-like racemes, not in definite rows on the branches of the inflorescence, usually on distinct pedicles of varying lengths. 2
 1. Spikelets borne in definite rows (usually 2 rows) on a simple inflorescence or on the branches of a compound inflorescence. 51
 2. Spikelets not enclosed in a prickly bur. 3
 2. Spikelets enclosed in a prickly bur; an annual grass. *Cenchrus*. (59)
 3. Spikelets articulated above the empty glumes. 4
 3. Spikelets articulated below the empty glumes, which are occasionally minute. 38
 4. Spikelets with 2 to many perfect flowers. 5
 4. Spikelets with but 1 perfect flower, rarely with 1 or 2 additional staminate flowers. 23
 5. Flowering glumes as long or longer than the empty glumes, unawned or with a straight awn from the apex. 6
 5. Flowering glumes generally shorter than the empty glumes, usually with a bent or twisted awn on the back below the apex of the lemma. 18.
 6. Rachilla of the spikelet naked or with hairs shorter than the flowering glumes. 7
 6. Rachilla with hairs longer than the flowering glumes; very tall stout grasses; lowest flower staminate, the others perfect. *Phragmites*. (14)
 7. Spikelets all alike. 8
 7. Spikelets of 2 kinds in a dense spike-like inflorescence, the fertile 1-3-flowered, the lower spikelets of the inflorescence clusters consisting of empty glumes. *Cynosurus*. (13)
 8. Lemma 5-many-nerved. 9
 8. Lemma 3-1-nerved. 14
 9. Spikelets not in dense 1-sided clusters on the inflorescence. 10
 9. Spikelets nearly sessile in dense 1-sided clusters at the ends of the panicle branches. *Dactylis* (6)
 10. Spikelets with the upper flowering glumes like the lower fertile ones, or if empty not enfolding each other. 11
 10. Spikelets with the upper flowering glumes empty and enfolding each other in a club-shaped mass. *Melica* (2)
 11. Lemma keeled; base of the flowers often with webby hairs. *Poa*. (5)
 11. Lemma rounded on the back or keeled only at the summit. 12
 12. Nerves of the lemma 5-7, prominent, parallel; style terminal; spikelets compressed cylindric, or little flattened. *Panicularia*. (4)
 12. Nerves of the lemma not prominent. 13
 13. Stigmas arising below the apex of the ovary; lemma 2-toothed. *Bromus*. (1)
 13. Stigmas at or near the apex of the ovary; lemma entire. *Festuca*. (3)
- 14—
14. Flowering glumes not coriaceous when mature, grain beakless and not exserted. 15
 14. Flowering glumes coriaceous in fruit, grain beaked and exserted; upper 2-4 lemmas empty. *Korycarpus*. (10)
 15. Lateral nerves of the lemma glabrous. 16.
 15. Lateral nerves of the lemma pilose. 17
 16. Panicle open; spikelets 3-many-flowered. *Eragrostis*. (7)
 16. Panicle dense and spike-like, spikelets 2-4-flowered. *Koeleria*. (9)

17. Palet not ciliate-fringed; internodes of the rachilla short; middle nerve or all three, excurrent between the acute lobes of the lemma. *Tridens*. (11)
17. Palet conspicuously ciliate-fringed; internodes of the rachilla long; middle nerve excurrent between the truncate lobes of the lemma. *Triplasis*. (12)
18. Rachilla prolonged beyond the upper glumes or flowers. 19
18. Rachilla not prolonged beyond the upper glumes; spikelets 2-flowered. *Aspris*. (20)
19. Awn projecting from between the lobes of the lemma, flattened and twisted. *Danthonia*. (15)
19. Awn of the lemma dorsal, not much flattened. 20
20. Spikelets 2-flowered, the upper bisporangiate, the lower staminate and its glumes strongly awned. *Arrhenatherum*. (16)
20. Spikelets 2-several-flowered; flowers all bisporangiate or the uppermost one imperfect. 21
21. Lemma keeled, awn arising from above the middle; spikelets less than $\frac{1}{2}$ in. long. *Trisetum*. (17)
21. Lemma rounded on the back. 22
22. Spikelet over $\frac{1}{2}$ in. long; grain furrowed, usually adherent to the palet. *Avena*. (18)
22. Spikelet less than $\frac{1}{2}$ in. long; grain unfurrowed, free from the palet. *Deschampsia*. (19)
23. Spikelets with a single perfect flower often at the side of the rachilla, not with vestigial flowers or glumes above the empty glumes. 24
23. Spikelets with a perfect flower at the top, sometimes with staminate or vestigial flowers below. 36
24. Lemma membranous, not indurated, not firmer than the empty glumes. 25.
24. Lemma indurated at maturity, firmer than the empty glumes. 33
25. Lemma awnless or with a dorsal awn, loosely enclosing the grain. 26
25. Lemma with a terminal awn or awn-pointed, closely enfolding the grain. 32
26. Empty glumes awned; inflorescence dense; lemma awnless. *Phleum*. (43)
26. Empty glumes awnless. 27.
27. Lemma 1-nerved. 28
27. Lemma 3-5-nerved. 29
28. Inflorescence lax, somewhat contracted; glumes not conspicuously compressed. *Sporobolus*. (35)
28. Inflorescence dense, spike-like; glumes conspicuously compressed-carinate. *Heleochoa*. (42)
29. Rachilla prolonged beyond the palet. 30
29. Rachilla not prolonged beyond the palet. *Agrostis*. (37)
30. Lemma long- or short-awned, sometimes on the back; panicle lax or contracted. 31
30. Lemma awnless; panicle dense and spike-like; leaves with deep grooves on the upper surface. *Ammophila*. (40)
31. Prolongation of the rachilla and callus with long hairs; lemma short-awned on the back; perennial. *Calamagrostis*. (36)
31. Prolongation of the rachilla naked; lemma long-awned; annual. *Apera*. (38)
32. Rachilla not prolonged beyond the base of the palet; lemma pointed or awned. *Muhlenbergia*. (44)
32. Rachilla prolonged into a bristle behind the palet; lemma long-awned. *Brachyelytrum*. (45)
33. Lemma awnless, its margins inrolled, spikelets without a basal callus. *Milium*. (46)
33. Lemma awned, its margins flat; spikelets with a basal callus. 34
34. Awn simple. 35
34. Awn 3-parted, the branches divaricate. *Aristida*. (49)

35. Lemma broad, glabrous, its awn deciduous; callus short, obtuse. *Oryzopsis* (47)
 35. Lemma narrow; its awn persistent; callus usually acute. *Stipa*. (48)
 36. Spikelets with a terminal perfect flower and 2 staminate lateral flowers. *Savastana*. (50)
 36. Spikelets with but 1 flower and sometimes with mere vestiges of lateral flowers. 37
 37. Empty glumes very unequal; stamens 2; third and fourth glumes (above the two empty glumes) awned upon the back. *Anthoxanthum*. (52)
 37. Empty glumes equal; stamens 3; third and fourth glumes small and vestigial not awned. *Phalaris*. (51)

—38—

38. Spikelets monocious, the staminate and carpellate spikelets in different parts of the inflorescence. 39
 38. Spikelets not monocious; staminate spikelets if present distributed among the perfect ones. 40
 39. Staminate and carpellate spikelets much alike in appearance, intermixed in the panicle, but the staminate at the top of the branches. *Zizaniopsis*.
 39. Staminate spikelets in the lower part of the panicle; the carpellate above, unlike in appearance. *Zizania*. (61)
 40. Inflorescence a compact spike-like panicle. 41
 40. Inflorescence a loose panicle or with slender branches. 42
 41. With an involucre of bristles about the base of the spikelets. *Chaetochloa* (58)
 41. Spikelets without a subtending involucre of bristles. *Alopecurus*. (41)
 42. Spikelets laterally compressed. 43
 42. Spikelets round, or dorsally compressed. 45
 43. Spikelets 2-3-flowered; empty glumes dissimilar. *Sphenopholis*. (8)
 43. Spikelets 1-flowered. 44
 44. Glumes 4; lemma with a short awn between the bifid apex. *Cinna*. (39)
 44. Glumes only 2, without awns. *Homalocenchrus*. (60)
 45. Flowering glumes chartaceous or coriaceous, differing from the membranous empty glumes. 46
 45. Flowering glumes thin and hyaline, usually much more delicate than the empty glumes. 48
 46. Margins of the fruiting flowering glumes hyaline and flat. *Leptoloma*. (54)
 46. Margin of the fruiting lemma inrolled and not hyaline. 47
 47. Sterile lemma awned or pointed; spikelets crowded in 1-sided racemes which are arranged in a panicle. *Echinochloa*. (56)
 47. Empty glumes and lemmas awnless; spikelets usually in panicles. *Panicum* (53)
 48. Stem solid. 49
 48. Stem hollow. 50
 49. Sessile spikelets perfect the stalked spikelet vestigial, spikelets on the ends of slender branches of a spreading panicle. *Holcus*. (62)
 49. Spikelets all perfect; arranged in pairs along the continuous branches of the panicle. *Miscanthus*. (64)
 50. Lemma with a hooked dorsal awn, spikelets in a loose panicle; plant softly pubescent. *Nothoholcus*. (21)
 50. Lemma with a prominent terminal awn; spikelets in a slender panicle; leaves scabrous and glaucous, the sheaths smooth. *Sorghastrum*. (63)

—51—

51. Spikelets not covered with a prickly bur. 52
 51. Spikelets covered with a prickly bur. *Cenchrus*. (59)

52. Inflorescence not monocious, altho the plants may be diecious. 53
 52. Monocious, the staminate and carpellate spikelets in different parts of the same inflorescence or on different inflorescences; stem solid. 72
53. Spikelets in a simple terminal spike. 54
 53. Spikelets usually on one side of digitate or racemose branches of the inflorescence. 61
54. Spikelets solitary at each node of the rachis. 55.
 54. Spikelets 2-several at each node of the rachis. 58.
55. Spikelets with their backs turned to the rachis. *Lolium.* (22)
 55. Spikelets with their sides turned to the rachis. 56
56. Palet adherent to the grain; wild perennial grasses. *Agropyron.* (23)
 56. Palet free from the grain; ours cultivated or escaped annuals. 57
57. Spikelets usually 3-several-flowered. *Triticum.* (24)
 57. Spikelets 2-flowered. *Secale.* (25)
58. Spikelets 2-several-flowered. 59
 58. Spikelets 1-flowered, sometimes with the vestige of a second flower, usually in threes at the joints of the rachis, some of the spikelets often vestigial. *Hordeum.* (28)
59. Rachis of the spike jointed and readily breaking up at maturity. *Sitanion.*
 59. Rachis not breaking up at maturity. 60
60. Spikes mostly dense; empty glumes a little smaller than the flowering glumes. *Elymus.* (26)
 60. Spikes very loose; empty glumes very small or none. *Hystris.* (27)
61. Joints of the rachis or rachilla with prominent hairs; stem solid; spikelets in pairs, 1 stalked and 1 sessile. 62
 61. Joints of the rachis or rachilla not with hairs, at most only short pubescent. 63
62. Spikelets all perfect. *Miscanthus.* (64)
 62. Sessile spikelets perfect, the pedicellate staminate or sterile and vestigial. *Andropogon.* (65)
63. Spikelets oval, articulated below the empty glumes, compact in form. 64
 63. Spikelets lanceolate, articulated above the empty glumes, except in *Spartina*; flowering glumes with awns or points. 68.
64. Inflorescence with prominently digitate branches or simple. 65
 64. Inflorescence branches racemose. 66
65. Lemma with inrolled margins, not hyaline; spikelets oblong to orbicular. *Paspalum.* (57)
 65. Lemma with hyaline margins, not inrolled; spikelets lanceolate. *Syntherisma.* (55)
66. Spikelets dorsally compressed; stems solid or with delicate pith. *Echinochloa.* (56)
 66. Spikelets laterally compressed. 67
67. Spikelets near the ends of long stalked branches of a spreading panicle. *Homalocenchrus.* (60)
 67. Spikelets in two rows on the erect branches of the panicle, the branches sessile. *Beckmannia.* (30)
68. Inflorescence with numerous short reflexed branches. *Atheropogon.* (33)
 68. Inflorescence with few spreading or ascending branches or with numerous digitate branches. 69
69. Inflorescence branches digitate. 70
 69. Inflorescence branches racemose. 71.
70. Spikelets 1-flowered; plants extensively creeping. *Capriola.* (31)
 70. Spikelets with 2-several perfect flowers, stems tufted. *Eleusine.* (32)

71. Spikelets strictly 1-flowered; branches of the inflorescence in our species usually numerous. *Spartina.* (29)
71. Spikelets with 1 perfect flower and 1 or more vestigial ones; branches of the inflorescence 4 or less. *Bouteloua.* (34)
72. Carpellate spikelets in pockets of the rachis; inflorescence without husks or hardened leaf-sheaths. *Tripsacum.* (66)
72. Carpellate spikelets covered with husks or with the thickened subtending leaf sheath. 73
73. Carpellate spikelets covered by a hardened leaf sheath, forming a bead-like fruit. *Coix.* (67)
73. Carpellate spikelets in rows on a cob, usually covered with papery husks. *Zea.* (68)

Subfamily, **Poacatae.**Tribe, **Festuceae.** Fescue-grass Tribe.

Grasses with laterally compressed, 2-several-flowered spikelets jointed above the empty glumes and arranged in panicles; empty glumes usually shorter than the flowering glumes; palea not awned or the awn terminal and straight, rarely born just below the apex.

1. **Bròmus** L. Chess, Brome-grass.

Annual or perennial grasses with terminal panicles. Spikelets rather large, few-many-flowered; empty glumes unequal, 1-5-nerved, acute; flowering glumes longer than the empty glumes; lemmas rounded on the back or sometimes compressed-keeled, 5-9-nerved, usually 2-toothed at the apex, generally awned; palea 2-keeled; stigmas sessile, plumose, inserted below a hairy cushion-like appendage at the top of the ovulary; grain adherent to the palea.

1. Outer or lower empty glume 3-nerved, the inner or upper one 5-9-nerved. 2
1. Outer empty glume 1-nerved, the inner one 3-nerved. 8
2. Lemma distinctly awned. 3
2. Lemma awnless or only awn-pointed, nearly as broad as long; annuals. *B. brizaeformis.*
3. Lemma pubescent on the back, with well developed hairs. 4
3. Lemma glabrous or minutely roughened on the back; annuals. 5
4. Hairs of the lemma long and silky; perennials. *B. kalmii.*
4. Hairs of the lemma short; annuals. *B. hordeaceus*
5. Leaf sheaths glabrous or only slightly pubescent; lemmas with strongly inrolled margins, the nerves not prominent. *B. secalinus.*
5. Leaf sheaths pubescent, often velvety; lemmas not with inrolled margins, the nerves prominent. 6
6. Panicle contracted, usually not over 3 in. long, its branches erect or ascending, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long. *B. hordeaceus leptostachys.*
6. Panicle loose and spreading, usually 6-12 in. long, its lower branches usually 2-6 in. long. 7
7. Sheaths pubescent; panicle 8 in. or less long; spikelets broadly lanceolate, usually 1 or 2 on the longer branchlets. *B. racemosus.*
7. Sheaths densely velvety-pubescent with reflexed hairs; panicle 8-12 in. long; spikelets lanceolate, several on the longer branchlets. *B. arvensis.*
8. Awn shorter than the body of the lemma, or wanting; rather tall perennials. 9
8. Awn longer than the body of the lemma; low annuals with drooping panicles. 12
9. Lemma awnless or merely awn-pointed. *B. inermis.*
9. Lemma awned. 10
10. Leaf sheaths glabrous or softly pubescent. 11
10. Leaf sheaths strongly retrorse-hirsute.
11. Lemma pubescent on the margins only. *B. asper.*
11. Lemma evenly pubescent all over the back. *B. ciliatus.*
12. Awn less than $\frac{3}{4}$ in. long; body of the lemma strigose; not over $\frac{1}{2}$ in. long. *B. purgans.*
12. Awn about 1 in. long or more; body of the lemma sparsely hispidulous, $\frac{1}{2}$ in. long or more. *B. tectorum.*
B. sterilis.

1. **Bromus brizaefórmis** Fisch. & Mey. Awnless Chess. An annual grass with stems 1-2 ft. high, erect, simple, the sheaths and blades pubescent. Panicle open and drooping; spikelets broadly ovate $\frac{1}{2}$ -1 in. long, awnless; lemma very broad, obtuse, 9-nerved, shining.

In fields and waste places. July, August. Introduced from Europe. Cuyahoga County.

2. **Bromus kàlmii** Gr. Kalm's Chess. A perennial grass with a slender stem, 1-3 ft. high, the sheaths and blades pubescent. Panicle open 2-6 inches long, its branches usually flexuous; spikelets drooping on capillary peduncles, densely silky pubescent all over; lemma 7-nerved, with a straight awn.

In dry ground, woods and thickets. June, July. Franklin, Lucas.

3. **Bromus hordeàceus** L. Soft Chess. An annual grass, the whole plant more or less pubescent, 1-3 ft. high, erect, with a rather contracted panicle with erect or ascending branches. Spikelets appressed-pubescent, on short pedicels; lemma awned, 7-9 nerved, awned between the obtuse or acute teeth. The var. *leptostachys* (Perr.) Beck. has glabrous or slightly scabrous spikelets.

A weed in fields and waste places. July, August. Introduced, Wayne, Lorain.

4. **Bromus secálinus** L. Common Chess. An annual grass with an erect stem 1-3 ft. high, its sheaths smooth and strongly nerved but the blades glabrous, rough, or sometimes hairy. Spikelets glabrous, turgid on somewhat drooping branches of the open panicle; lemma short-awned, becoming convex, thick and inrolled at the margins.

Common in fields and waste places and often a pernicious weed in grain fields. According to an old superstition wheat changes to this chess which is, of course, absolutely impossible. Also called cheat. Naturalized from Europe. General and abundant.

5. **Bromus racemòsus** L. Upright Chess. An annual erect grass, 1-3 ft. high, with pubescent sheaths and short erect panicles. Spikelets glabrous; lemma obtuse, awned, smooth and shining, the nerves prominent.

In fields and waste places. June-August. Naturalized from Europe. General and abundant.

6. **Bromus arvénsis** L. Field Chess. An annual grass with erect stems, 1-3 ft. high, pubescent sheaths, and large open panicles with long drooping branches. Spikelets, lanceolate, somewhat shining; lemma smooth or minutely scabrous, 5-nerved, broadest at the middle, bearing an erect awn.

In fields and waste places. Summer. Introduced from Europe. Franklin County.

7. **Bromus inermis** Leyss. Hungarian Brome-grass. A perennial grass with tufted stems, 2-3½ ft. high, with smooth and glabrous leaves and an oblong panicle of erect oblong spikelets. Lemma 5-7-nerved, awnless or sometimes awn-pointed. An important grass for pasture and hay.

In fields and waste places. June, July. Introduced from Europe. Wayne County.

8. **Bromus ciliatus** L. Fringed Brome-grass. An erect perennial, 2-4 ft. high, with retrorsely pubescent or nearly smooth sheaths and a broad, lax, drooping panicle whose branches are spikelet-bearing near the ends. Spikelets 5-10-flowered; lemma smooth on the back, pubescent along the margins, 5-7-nerved, obtuse and slightly bifid at the apex which ends in a straight awn. Very variable.

In moist woods and thickets. July, August. Erie, Wayne, Franklin, Champaign, Hocking.

9. **Bromus pürgans** L. Hairy Brome-grass. A perennial grass with erect rather stout stems, 2-5 ft. high, sparsely retrorse-pilose sheaths, and large lax nodding panicles. Spikelets, 7-12-flowered; lemma lanceolate, acute, densely pubescent, 5-7-nerved, emarginate and with a short straight awn.

In moist rocky woodlands. June-August. General.

10. **Bromus áasper** Murr. Rough Brome-grass. A perennial grass with simple erect rough stems, 2-6 ft. high, retrorse-hirsute leaf-sheaths, and an open panicle with drooping branches. Spikelets 5-10-flowered; lemma acute, hispid near the margins and on the lower part of the keel, short awned.

In waste places. July, August. Naturalized from Europe. No specimens.

11. **Bromus tectorum** L. Downy Brome-grass. A short-lived annual, ½-3⅓ ft. high, with slender tufted stems, pubescent sheaths and leaf-blades, and broad, rather dense, one-sided drooping panicles. Spikelets nodding, 5-8-flowered; lemma long-awned, 7-nerved, usually hirsute-pubescent. A weed.

In waste places and roadsides. May-July. Introduced from Europe. General and abundant.

12. **Bromus stérilis** L. Barren Brome-grass. An erect annual grass, 1-3 ft. high, with a broad lax drooping panicle, the slender branches usually with but 1 spikelet, and with smooth or sometimes pubescent sheaths. Spikelets spreading or pendulous; lemma acuminate, long-awned, 7-nerved, scabrous on the nerves.

In waste places. June, July. Introduced from Europe. Licking, Sandusky, Cuyahoga.

2. *Mélica* L. Melic-grass.

Perennial grasses with simple stems, and rather large spikelets in narrow panicles. Spikelets 2-several-flowered, often secund; rachilla extended beyond the normal flowers and usually bearing 2-3 club-shaped or hooded glumes, convolute around each other; empty glumes large, unequal, membranous, 3-5-nerved; lemmas 7-13-nerved, sometimes awned, the margins more or less scarious; palets broad, 2-keeled; grain free.

1. *Melica nítens* Nutt. Tall Melic-grass. An erect simple smooth and glabrous grass with hollow stems, 2-4 ft. high, and an elongated open panicle with short spreading or ascending branches. Spikelets numerous, usually more or less secund, nodding, on flexuous pedicels, usually with 3 perfect flowers; lemmas scabrous, acute.

In rocky woods and open places. May, June. Erie County.

3. *Festùca* L. Fescue-grass.

Perennials or annuals with flat or convolute leaf-blades and terminal panicles. Spikelets 2-many-flowered; empty glumes unequal, narrow, acute, keeled, the outer 1-nerved, the inner 3-nerved; lemma narrow, rounded on the back, 5-nerved, usually awned at the apex; palet usually about as long as the lemma; styles very short, stigmas plumose.

1. Leaves flat, over $\frac{1}{8}$ in. wide; lemma awnless; perennial. 2
1. Leaves setaceous, usually involute or folded, less than $\frac{1}{8}$ in. wide. 4
2. Panicle narrow, with short erect branches; spikelets 5-10-flowered; lemma usually $\frac{1}{4}$ in. or more long. *F. elatior.*
2. Panicle with long, spreading or ascending branches; spikelets 3-6-flowered; lemma less than $\frac{1}{4}$ in. long. 3
3. Spikelets broadly obovate; panicle branches spikelet-bearing from or below the middle. *F. shortii.*
3. Spikelets lanceolate; branches of the panicle elongated, the spikelets loosely scattered at the ends. *F. nutans.*
4. Lemma awnless or short-awned; perennial; stamens 3. 5
4. Lemma long-awned; annual; stamen usually 1. 6
5. Lemma short-awned; leaves setaceous. *F. ovina.*
5. Lemma awnless; leaves capillary. *F. capillata.*
6. Outer empty glume more than $\frac{1}{2}$ as long as the inner; awn not longer than the body of the lemma. *F. octoflora.*
6. Outer empty glume less than $\frac{1}{2}$ as long as the inner; awn of the lemma longer than its body. *F. myuros.*

1. *Festuca elàtior* L. Tall Fescue-grass. A loosely tufted perennial, 2-5 ft. high, often with short creeping rhizomes. Spikelets broadly obovate when mature, 3-6-flowered, on erect contracted panicles whose branches are spikelet-bearing nearly to the base; lemma oblong-lanceolate, scabrous at the summit, faintly 5-nerved, acute or rarely short-awned.

In meadows and waste places. Cultivated for hay. Also called

meadow fescue-grass. June-August. Introduced from Europe. General.

2. **Festuca nùtans** Willd. Nodding Fescue-grass. A perennial grass with simple, erect, slender stems, 2-3 ft. high, with glabrous or pubescent leaf-sheaths and a very loose panicle whose branches are secund and spikelet-bearing near the ends, at first erect and finally spreading. Spikelets lanceolate, 3-5-flowered; lemma oblong-ovate, acute, very faintly nerved.

In moist woods and copses. June, July. General.

3. **Festuca ovina** L. Sheep Fescue-grass. A densely tufted perennial $\frac{1}{2}$ -2 ft. high, with crowded sheaths at the base and pale green filiform or setaceous blades. Panicle contracted after blooming; spikelets with rather loose flowers; lemma smooth or slightly scabrous, acute and short awned. Many varieties.

A good pasture grass. In fields and waste places. June, July. From Europe. Erie, Franklin, Wayne.

4. **Festuca capillàta** Lam. Filiform Fescue-grass. A densely tufted perennial with slender, smooth and glaucous stems, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high, and with filiform leaf blades. Panicle contracted with erect branches; spikelets 4-5-flowered; lemma acute, unawned.

In fields and along roadsides. June, July. From Europe. Cuyahoga County.

5. **Festuca octoflòra** Walt. Slender Fescue-grass. A slender, small, erect annual, often tufted, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high, with sheaths shorter than the internodes and narrowly linear usually involute blades. Panicle narrow, erect, usually reduced to a more or less second raceme; spikelets 6-13-flowered; lemma usually very scabrous, acuminate into a straight awn; stamens 2.

In dry sterile or sandy soil. June-August. Ashtabula, Erie, Lucas, Ashland, Delaware, Licking, Lawrence.

6. **Festuca myùros** L. Rat-tail Fescue-grass. A smooth, glabrous annual, 1-2 ft. high, with solitary or small tufted stems and overlapping sheaths. Leaf-blades smooth, linear, involute, erect. Panicle usually 1-sided, contracted, its branches appressed; spikelets 3-6-flowered; lemma linear-lanceolate, scabrous above, attenuate into a slender awn; stamen 1.

In dry fields and waste places. June, July. From Europe. Lake County.

4. **Paniculària** Fabr. Manna-grass.

Mostly tall, perennial, hydrophytic grasses with simple stems and terminal panicles. Spikelets few-many-flowered, terete or somewhat flattened; empty glumes unequal, 1-3-nerved; lemmas rounded

on the back with scarious margins or apex, 5-9-nerved; palets with the 2 keels near the margin; stamens 2 or 3; stigmas plumose; grain smooth.

1. Spikelets linear or compressed cylindric, $\frac{1}{2}$ in. long or more. 2
1. Spikelets ovate or oblong, $\frac{1}{3}$ in. long or less. 3
2. Lemma acute, much shorter than the palet, about $\frac{1}{3}$ in. long. *P. acutiflora.*
2. Lemma obtuse, nearly as long as the palet, about $\frac{1}{4}$ in. long. *P. septentrionalis.*
3. Lemma very broad, obscurely nerved; panicle open; spikelets 5-12-flowered. *P. canadensis.*
3. Lemma rather narrow, sharply and distinctly 7-nerved. 4
4. Panicle contracted, elongated and narrow; spikelets 3-4-flowered. *P. torreyana.*
4. Panicle open and lax, not elongated, its branches usually spreading or drooping. 5
5. Empty glumes obtuse or rounded at the apex. 6
5. Empty glumes truncate and denticulate at the apex; inner empty glumes nearly $\frac{1}{8}$ in. long; panicle rather narrow, with few spikelets, usually less than 6 in. long. *P. pallida.*
6. Spikelet $\frac{1}{8}$ in. long or less; branches of the panicle often drooping; inner empty glume about $\frac{1}{16}$ in. long. *P. nervata.*
6. Spikelet nearly $\frac{1}{4}$ in. long; branches of the panicle ascending or spreading; inner empty glume nearly $\frac{1}{8}$ in. long. *P. grandis.*

1. **Panicularia acutiflora** (Torr.) Ktz. Sharp-glumed Manna-grass. A grass 1-2 ft. high, with flattened weak and slender stems, and with overlapping sheaths, the uppermost inclosing the base of the slender panicle. Spikelets linear, 5-12-flowered, erect on the panicle, lemma acute, scabrous, much exceeded by the long-acuminate palet.

In wet soil and shallow water. June-August. No specimens.

2. **Panicularia septentrionalis** (Hitch.) Bickn. Floating Manna-grass. An erect grass with somewhat flattened stems, 2-3 ft. high, from a creeping base and with a very slender panicle of a few remote branches which are at first appressed or finally horizontal. Spikelets 7-12-flowered, compressed-cylindric, subsessile; lemma hispidulous, 7-nerved, obtuse, somewhat exceeded by the acuminate palet.

In shallow water. June, July. General as far south as Harrison, Perry, Franklin and Auglaize Counties.

3. **Panicularia canadensis** (Mx.) Ktz. Rattlesnake Manna-grass. A grass with erect simple stems, 2-3 ft. high, with compressed sheaths, and with very loose open panicles, the remote capillary branches drooping. Spikelets 5-12-flowered, ovate, tumid; lemma broad, obtuse or abruptly acute, obscurely 7-nerved.

In swamps and wet places. July, August. Ashtabula, Geauga, Portage, Cuyahoga, Lorain, Summit, Stark, Wayne.

4. **Panicularia torreyana** (Spreng.) Merr. Long Manna-grass. A grass with solitary or few erect stems, 1-3 ft. high, from a run-

ning rhizome. Panicle dense, contracted, with erect branches; spikelets 3-7-flowered, appressed; lemma narrow, acute, 7-nerved.

In wet woods. August, September. Ashtabula, Cuyahoga, Summit, Erie, Fairfield.

5. *Panicularia nervàta* (Willd.) Ktz. Nerved Manna-grass. A grass with erect, simple, slender stems, 1-3 ft. high, often in large clumps, with an expanded nodding panicle, the capillary branches drooping. Spikelets 3-7-flowered, purplish; lemma obtuse or rounded, with 7 sharp, distinct nerves.

In wet places. June-August. General.

6. *Panicularia grândis* (Wats.) Nash. Tall Manna-grass. A grass with stout erect clustered stems, 3-5 ft. high, and a very compound loose and open panicle, nodding at the summit. Spikelets 4-7-flowered with purple flowering glumes and whitish empty glumes; lemma 7-nerved, obtuse or rounded at the apex.

In wet soil and ditches. June-August. Stark, Wayne.

7. *Panicularia pállida* (Torr.) Ktz. Pale Manna-grass. A grass with pale green slender stems, 1-3 ft. high, ascending from a creeping base. Panicle lax, few-flowered; spikelets 4-8-flowered, pale green; lemma 7-nerved, truncate and denticulate at the apex.

In shallow water. July, August. Trumbull County. (Ottawa County—Moseley Herbarium)

5. *Pòa* L. Blue-grass, Meadow-grass, Spear-grass.

Perennial or annual grasses with flat or convolute leaves ending in a cucullate tip, and with terminal panicles. Spikelets 2-6-flowered, compressed; empty glumes keeled, 1-3-nerved; flowering glumes longer than the empty ones, commonly with a tuft of cobwebby hairs at the base, 5-nerved; palets 2-nerved or 2-keeled, 2-toothed at the apex; styles short, stigmas plumose; grain free or sometimes adherent to the palet.

1. Flowering glumes not with webby hairs at the base, naked or with short hairs. 2

1. Flowering glumes with webby hairs at the base; stems tufted. 4

2. Stems much flattened, not tufted; rhizome long and creeping; lemma obscurely 3-nerved. *P. compressa.*

2. Stems little or not at all flattened, tufted; lemma 5-nerved. 3

3. Lemma with the midnerve silky-pubescent for $\frac{3}{4}$ its length; perennials

P. autumnalis.

3. Lemma with the midnerve pilose below; annuals.

P. annua.

4. Lemma glabrous; stems distinctly compressed; perennial.

P. debilis.

4. Lemma somewhat pubescent above the basal webby hairs; stems round or only slightly compressed. 5

5. Lateral nerves of the lemma glabrous. 6

5. Lateral nerves of the lemma pubescent. 7

6. Plant yellowish green; lemma less than $\frac{1}{8}$ in. long.

P. trivialis.

6. Plant green; lemma more than $\frac{1}{8}$ in. long.

P. alsodes.

7. Panicle-branches dividing and spikelet-bearing at or below the middle; basal leaves much shorter than the stem. 8
7. Panicle-branches usually dividing and spikelet-bearing only at the ends; basal leaves very long, the early ones often as long as the stem. *P. brachyphylla*.
8. Intermediate nerves of the lemma obscure. 9
8. Intermediate nerves of the lemma prominent. 10
9. Panicle erect, rarely over 5 in. long, its branches ascending; empty glumes narrow. *P. nemoralis*.
9. Panicle drooping, often 1 foot or more long, its branches spreading. *P. triflora*.
10. Midnerve of the lemma pubescent only below; spikelets crowded on the branches. *P. pratensis*.
10. Midnerve of the lemma pubescent its whole length; spikelets scattered on the spreading, often reflexed branches. *P. sylvestris*.

1. **Poa compressa** L. Flat-stemmed Blue-grass. A perennial grass of a pale bluish green color with wiry flattened stems, decumbent at the base, $\frac{1}{2}$ -2 ft. high, from long horizontal rhizomes. Panicles narrow with erect or ascending branches, spikelet-bearing to the base. Spikelets 3-9-flowered; lemma obscurely 3-nerved, the nerves sparingly pubescent toward the base, more or less bronzed at the summit.

A grass of some importance in dry mostly sterile soil, in cultivated fields and in woods. Also called English blue-grass. May-September. From Europe. General and abundant.

2. **Poa trivialis** L. Rough-stalked Meadow-grass. A perennial grass with erect stems from a somewhat decumbent base, 1-3 ft. high, scabrous below the panicle. Panicle open, its branches usually spreading or ascending; leaf-sheaths and blades retrorsely scabrous; spikelets 2-3-flowered; lemma webby at the base, strongly 5-nerved, the midnerve silky-pubescent below, the lateral nerves naked.

An important grass in meadows, roadsides, and waste places. May-August. From Europe. Crawford County.

3. **Poa debilis** Torr. Weak Spear-grass. A perennial grass with erect, weak, slender, nearly terete stems, 1-2 $\frac{1}{2}$ ft. high, with compressed sheaths much shorter than the internodes, and with an open nodding panicle, the few, long, capillary branches ascending or spreading at the ends. Spikelets 2-4-flowered; lemma obtuse, glabrous except the webby base.

In rocky woodlands. May-July. Trumbull County. (Erie County—Moseley Herbarium.)

4. **Poa triflora** Gilib. Fowl Meadow-grass. A perennial grass with erect stems, 1-5 ft. high, and with a pyramidal or oblong panicle, often purplish, its filiform branches spreading. Spikelets 3-4-flowered; lemma obtuse with copious webby hairs, its intermediate nerves obscure, midnerve and marginal nerves pubescent on the lower half.

In wet meadows and swampy places. Also called false red-top. July-August. Fairfield, Geauga, Lawrence.

5. *Poa nemoralis* L. Wood Meadow-grass. A perennial grass with slender leafy stems, 1-2 ft. high, and an open spreading panicle. Spikelets 2-5-flowered; lemma with obscure intermediate nerves, with a few webby hairs at the base.

Meadows and open woods. June-September. Introduced from Europe. Lake County.

6. *Poa pratensis* L. Kentucky Blue-grass. A perennial grass, sending out numerous running rhizomes from the base, with simple erect stems, 1-4 ft. high, with compressed sheaths, and with a pyramidal panicle, the spreading or ascending slender branches divided and spikelet-bearing above the middle. Spikelets 3-5-flowered, crowded; lemma conspicuously webbed at the base, 5-nerved, the marginal nerve and midnerve pubescent below, the intermediate ones naked.

A very important grass extensively used for pastures and lawns and to some extent for hay. In fields, meadows, and woods. May-August. General and abundant.

7. *Poa autumnalis* Muhl. Flexuous Spear-grass. A perennial grass with erect slender stems, 1-3 ft. high, and a panicle with long, capillary, flexuous, spreading branches bearing a few spikelets near the ends. Spikelets 3-6-flowered, lemma not webby at the base but pubescent below between the strong nerves, the midnerve silky pubescent for three-fourths its length.

In woods. March-May. Hocking County.

8. *Poa sylvestris* Gr. Sylvan Spear-grass. A perennial grass with simple, slender, erect, slightly flattened stems, 1-3 ft. high, and oblong-pyramidal panicles with spreading ascending or reflexed branches spikelet-bearing at the extremities. Spikelets 2-4-flowered; lemma webbed at the base, pubescent below, 5-nerved, the midnerve pubescent nearly its entire length, the marginal nerves pubescent below the middle.

In meadows, woods, and thickets. May-July. Rather general; no specimens from the northwestern counties.

9. *Poa alsodes* Gr. Grove Meadow-grass. A perennial grass with simple, erect, slender stems, $\frac{1}{2}$ -2 $\frac{1}{2}$ ft. high, with long sheaths, the uppermost often sheathing the base of the panicle, and with a panicle of spreading or ascending branches, spikelet-bearing at the ends. Spikelets 2-3-flowered; lemma webbed at the base, faintly nerved, the midnerve pubescent below.

Wooded hillsides and thickets. May, June. Seneca, Franklin, Summit, Cuyahoga, Trumbull, Knox.

10. *Poa brachyphylla* Schult. Short-leaf Spear-grass. A perennial grass with stems 1-3 ft. high from running rhizomes, with

basal leaves often about equalling the stems and abruptly cuspidate-tipped, and with an open panicle whose ascending, spreading or reflexed branches are spikelet-bearing at the ends. Spikelets 3-5-flowered; lemma webby at the base, the keel and marginal nerves sparingly pubescent, the intermediate nerves prominent and naked.

In rocky woodlands. April-June. Lawrence, Perry, Medina, Cuyahoga, Trumbull.

11. *Poa ánnua* L. Annual Meadow-grass. An annual grass with flattened stems, $\frac{1}{4}$ -1 ft. high, decumbent at the base, with loose sheaths, very soft leaves, and a pyramidal panicle with open spreading branches. Spikelets 3-6-flowered, crowded; lemma distinctly 5-nerved, the nerves hairy below.

Cultivated and waste ground. April-October. From Europe. General.

6. *Dáctylis* L. Orchard-grass.

Tall perennial grasses with glomerate panicles. Spikelets 2-5-flowered, compressed, nearly sessile, in dense capitate clusters; empty glumes thin-membranous, hispid-ciliate on the keel, acute or mucronate; lemmas 5-nerved, keeled, the midnerve extended into a point or short awn; palets 2-keeled; grain free, enclosed in the lemma and palet.

1. *Dactylis glomeràta* L. Orchard-grass. A coarse tufted glaucous grass with simple erect stems, 2-4 ft. high, and a panicle with a few stiff contracted branches, naked below and bearing dense one-sided clusters of spikelets at the ends. Spikelets 3-5-flowered; lemma 5-nerved, short-awned, rough, ciliate on the keel.

An important hay and pasture grass cultivated to some extent. In fields and waste places. June, July. Naturalized from Europe. General; no specimens from the southeastern counties.

7. *Eragróstis* Beauv. Love-grass.

Annual or perennial grasses with the spikelets in loose or dense terminal panicles. Spikelets strongly flattened; 3-many-flowered; empty glumes unequal, shorter than the flowering ones, keeled, 1-nerved or the inner 3-nerved; lemma membranous, keeled, 3-nerved; palet shorter, prominently 2-nerved or 2-keeled; grain free, loosely enclosed in the flowering glumes.

1. Spikelets 5-35-flowered; $\frac{1}{8}$ - $\frac{2}{3}$ in. long. 2

1. Spikelets 2-5-flowered; $\frac{1}{8}$ in. or less long; annuals. 5

2. Stems erect or ascending, simple, rigid, 1-2 $\frac{1}{2}$ ft. tall; flowers bisporangiate; perennials. *E. pectinacea.*

2. Stems extensively creeping; plants diecious, annual. *E. hypnoides.*
2. Stems usually decumbent at the base and generally much branched; flowers bisporangiate; annuals. 3
3. Spikelets nearly or quite $\frac{1}{8}$ in. wide; plants with very strong odor. *E. major.*
3. Spikelets $\frac{1}{8}$ in. wide or less. 4
4. Lemmas usually dull-purple or green, the lateral nerves very prominent; spikelets about $\frac{1}{8}$ in. wide; outer empty glume about $\frac{2}{3}$ as long as the inner. *E. purshii*
4. Lemmas usually bright purplish, the lateral nerves faint or wanting; spikelets less than $\frac{1}{8}$ in. wide; outer empty glume $\frac{1}{2}$ as long as the inner. *E. pilosa.*
5. Pedicels and branches of the panicle short; stems branched above the base. *E. frankii.*
5. Pedicels and branches of the panicle long and capillary; stems branched only at the base. *E. capillaris.*

1. **Eragrostis pectinàcea** (Mx.) Steud. Purple Love-grass. An erect or ascending, perennial grass with a rigid stem, 1-2½ ft. high, from a short stout rhizome, with over-lapping sheaths, sparingly villous and densely bearded at the throat. Panicle purple or purplish, included at the base at least at first, its widely spreading or reflexed branches strongly bearded at the base; spikelets 5-12-flowered, on stiff pedicels; lemma acute, minutely scabrous, its lateral nerves prominent.

In dry sandy soil. July-September. Lake, Cuyahoga, Erie, Auglaize.

2. **Eragrostis hypnòides** (Lam.) B. S. P. Creeping Love-grass. An annual grass with an extensively creeping stem sending up panicle-bearing branches, $\frac{1}{4}$ -1½ ft. high. Panicles nearly simple, sometimes nearly capitate. Spikelets 10-35-flowered, the flowers bisporangiate, staminate, or carpellate; lemma acuminate its lateral nerves prominent.

In sandy or gravelly soil along shores and ditches. August, September. Rather general; no specimens from the central eastern counties.

3. **Eragrostis màjor** Host. Strong-scented Love-grass. A beautiful erect or ascending or occasionally prostrate grass with rather flaccid, freely branching stems, $\frac{1}{2}$ -4 ft. high or long, with a strong scent, and with greenish-lead-colored, rather densely flowered panicles. Spikelets 10-40-flowered, the flowers closely imbricated; pedicels and keels of the empty glumes sparingly glandular; lemma thin, obtuse, scabrous, the lateral nerves prominent.

A common weed in cultivated fields and waste places. Also called stink-grass. July-September. Naturalized from Europe. General.

4. **Eragrostis púrshii** Schrad. Pursh's Love-grass. An annual tufted grass, usually decumbent at the base and much branched, the stems $\frac{1}{2}$ -1½ ft. long. Panicle open, its branches spreading,

naked in the axils. Spikelets 5-15-flowered, dull purple or green: lemma firm, acute, the lateral nerves prominent.

In dry soil. August, September. General.

5. *Eragrostis pilosa* (L.) Beauv. Tufted Love-grass. An annual grass with slender, tufted, diffusely branching stems, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high, with a decumbent or spreading base, and with a diffuse panicle whose lower axils are usually sparingly bearded. Spikelets 5-18-flowered, becoming linear: lemma subacute, usually purplish, the lateral nerves faint.

In waste places or cultivated ground. August, September. Rather general; no specimens from the northwestern counties. Naturalized.

6. *Eragrostis franksii* Steud. Frank's Love-grass. An annual, diffusely branched grass with tufted erect or decumbent stems, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high and an oblong open panicle with short spreading branches. Spikelets ovate, 3-5-flowered, on more or less appressed pedicels; lemma very acute; faintly 3-nerved.

In low or sandy places. August-October. Rather general; no specimens from the south-eastern nor from the north-western counties.

7. *Eragrostis capillaris* (L.) Nees. Capillary Love-grass. A slender, erect, sparingly branched annual grass, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high with panicles more than half the entire length of the plant, oblong-ovoid in shape, the capillary branches spreading or ascending. Spikelets ovate, 2-4-flowered, on long, divergent pedicels; lemma acute, faintly 3-nerved. Often lemon-scented.

Considered a weed. In dry, sandy soil. August, September. Ottawa, Madison, Clinton.

8. *Sphenopholis* Scrib. Eaton-grass.

Slender tufted perennials, usually with narrow terminal panicles. Spikelets 2-3-flowered, the rachilla articulated between and extended beyond the flowers, the pedicels jointed just below the glumes: outer empty glume linear, acute, 1-nerved, the inner much broader, 3-nerved, usually obtuse or rounded at the apex, the margins scarious; lemma chartaceous, with obscure nerves; palea narrow, 2-nerved; grain free, enclosed in the rigid lemma.

1. Empty glumes unequal, the outer shorter and about $\frac{1}{3}$ as wide as the inner. 2
1. Empty glumes nearly equal the outer not less than $\frac{1}{3}$ as wide as the inner; branches of the lax panicle more or less spreading. *S. nitida.*
2. Inner empty glume obovate; panicle narrow, densely flowered. *S. obtusata.*
2. Inner empty glume narrowly obovate to oblanceolate; branches of the lax panicle more or less spreading. *S. pallens.*

1. **Sphenopholis obtusàta** (Mx.) Scrib. Blunt-glumed Eaton-grass. An erect rather stout grass, 1-2½ ft. high with a dense generally spike-like, strict panicle with erect branches. Spikelets 2-3-flowered; lemma narrow, obtuse; empty glumes unequal, often purplish, the first narrow, shorter than the inner which is sub-cucullate and about six times as wide.

In dry soil. June-August. No specimens.

2. **Sphenopholis pállens** (Spreng.) Scrib. Tall Eaton-grass. An erect, usually slender grass with simple stems, 1-3 ft. high, and lax, nodding panicles. Spikelets oblong-lanceolate, usually numerous and somewhat crowded and appressed to the branches; lemma lanceolate, acute, rarely awned; empty glumes unequal, the outer narrow and about ½ as broad as the obtuse or abruptly acute inner one, which is smooth or somewhat rough on the keel.

In woods or moist soil. June, July. General.

3. **Sphenopholis nítida** (Spreng.) Scrib. Slender Eaton-grass. A grass with very slender erect stems, 1-2 ft. high, with pubescent sheaths and leaves, and with a loosely flowered panicle, the branches spreading at flowering time and later becoming erect. Spikelets cuneiform, not crowded; empty glumes smooth, the outer about one-third as wide as the inner; lemma narrow, smooth, obtuse, rarely short-awned.

In dry woods. May, June. Cuyahoga, Knox, Licking, Fairfield, Hocking, Lawrence, Adams.

9. **Koelèria** Pers. Koeler-grass.

Tufted perennials with narrow leaves and mostly densely flowered terminal spike-like panicles. Spikelets 2-4-flowered; rachilla prolonged into a naked pedicel behind the upper palet; empty glumes narrow, acute, unequal, keeled, with scarious margins; lemma faintly 3-5-nerved; palet 2-keeled; grain free, loosely inclosed within the subrigid lemma.

1. **Koeleria cristàta** (L.) Pers. Crested Koeler-grass. A perennial grass with simple rigid erect stems, 1-2½ ft. high, with retrorsely pubescent sheaths, and with pale green, spike-like, cylindrical panicles. Spikelet 2-5-flowered; lemma scabrous, shining.

A valuable pasture grass in the west. In dry sandy soil, especially on prairies. July-September. Ottawa County.

10. **Korycàrpus** Zea. Korycarpus.

Erect, nearly smooth parennials with narrow paniculate or racemose inflorescence. Spikelets 3-5-flowered, the rachilla articulated between the flowers; empty glumes much shorter than the

flowering glumes; lemma broad, coriaceous and shining, 3-nerved; palet firm, 2-keeled; stamens 2, rarely 1; grain beaked, free.

1. **Korycarpus arundinæus** Zea. American Korycarpus. A grass with simple erect stems, very rough below the panicle, 1½-4 ft. high, and with very simple panicles. Spikelets short-pedicel, 3-5-flowered, erect; lemma somewhat abruptly acuminate.

In rich woods and shaded river banks. July-September. Ross, Franklin, Auglaize, Highland.

11. **Tridens** R. & S. Purple-top.

Perennial grasses with long leaves and terminal open or contracted panicles. Spikelets 3-many-flowered; empty glumes unequal, keeled, shorter than the spikelet; lemma 3-nerved, bidentate, the nerves silky-villous below; palet broad, compressed, 2-keeled.

1. **Tridens flava** (L.) Hitch. Tall Purple-top. A grass with erect stems, viscid on the axis of the panicle and below it, 2-5 ft. high, with the leaf-sheaths bearded at the summit, and with showy loose and open panicles with slender spreading branches. Spikelets 4-8-flowered, purple, on long pedicels; lemma oval, the three nerves pilose and excurrent as short points. Many small insects are caught by the viscid panicle.

In dry and especially sandy fields and waste places. July-September. Rather general; no specimens from the northwestern counties nor the extreme eastern part.

12. **Triplasis** Beauv. Sand-grass.

Perennials with small, nearly simple, contracted or open panicles. Spikelets 3-6-flowered, rachilla articulated between the remote flowers; empty glumes keeled; lemma short-awned, 2-cleft, with 3 strongly ciliate nerves; palet 2-keeled, the keels long ciliate; grain free.

1. **Triplasis purpurea** (Walt.) Chapm. Purple Sand-grass. A tufted grass with widely spreading or ascending stems, 1-3 ft. long, with short internodes, short convolute leaf blades, the uppermost minute, and with a small terminal panicle composed of a few rigid branches which are finally divergent. Smaller panicles produced later in the season at the nodes of the stem. Spikelets 2-5-flowered, usually rose-purple; lemma with a short awn scarcely exceeding its truncate lobes; palet with abundant long hairs on the two nerves. Plant acid to the taste.

In sandy soil, especially on sea beaches. August, September. Ashtabula, Cuyahoga, Erie.

13. *Cynosurus* L. Dogtail-grass.

Annual or perennial tufted grasses with dense, erect, spike-like panicles. Spikelets of 2 kinds, in small clusters; the lower spikelets of the clusters consisting of narrow glumes and continuous rachilla, the terminal spikelets of broader glumes and articulated rachilla and containing perfect flowers; empty glumes of the fertile spikelets 1-nerved; lemma 1-3-nerved, pointed or short-awned; glumes of the sterile spikelets spreading, 1-nerved; grain finally adherent to the palet.

1. *Cynosurus cristatus* L. Dogtail-grass. An erect slender perennial grass with simple stems, 1-2½ ft. high, with narrow leaves, and dense spike-like long exserted panicles. Spikelets of two kinds, in small clusters, the upper with bisporangiate flowers the lower with sterile vestigial flowers; lemma of the perfect flower pointed or short-awned; lemma of the sterile flowers very narrow, pointed, and strongly scabrous on the keel.

In fields and waste places. June-August. From Europe. Mahoning County.

14. *Phragmites* Trin. Reed-grass.

Tall reed-like perennial grasses with stout, hollow, leafy stems, broad leaf blades, and large terminal panicles. Spikelets 3-7-flowered, rachilla articulated, with long silky hairs; empty glumes unequal, lanceolate, acute; lowest lemma empty or subtending a staminate flower; lemmas of the perfect flowers glabrous, narrow, long-acuminate, much exceeding the short palet; grain free.

1. *Phragmites phragmites* (L.) Karst. Reed-grass. A tall reed-like perennial grass with stout, hollow, leafy stems, 5-15 ft. high, from long creeping rhizomes, with overlapping sheaths, and with a large, tawney, rather densely flowered panicle whose branches are ascending. Spikelets 3-7-flowered, the flowers shorter than the long hairs of the rachilla; palet 3-nerved, long-acuminate. Can be used for thatching.

In swamps and wet places. August-October. Ashtabula, Cuyahoga, Erie, Lucas, Huron, Wayne, Franklin.

Pampas-grass (*Cortaderia argentea*) is a related perennial grass, 6-10 ft. high with a very large, dense, silky panicle, cultivated for ornament. It might perhaps be successfully planted in protected places in southern Ohio.

Tribe, **Aveneae.** Oats Tribe.

Grasses with laterally compressed, 2-several-flowered spikelets, usually jointed above the empty glumes and arranged in panicles; empty glumes usually longer than the flowering glumes; one or more of the paleas usually awned on the back or from between the 2-toothed apex.

15. **Danthônia** DC. Wild-oat-grass.

Mostly erect perennials with narrow leaves and small terminal contracted or open panicles. Spikelets 3-many-flowered, the uppermost staminate or vestigial; rachilla pubescent, extending beyond the flowers; empty glumes keeled, acute, subequal, much longer than the lemmas, usually exceeding the uppermost flower; lemmas rounded on the back, 2-toothed, with a flat, twisted and bent awn between the teeth; palea hyaline, 2-keeled; grain free.

1. Teeth of the lemma triangular, not awn-pointed; leaves of the stem short. *D. spicata.*
1. Teeth of the lemma aristate; leaves of the stem elongated. *D. compressa.*

1. **Danthonia spicàta** (L.) Beauv. Common Wild-oat-grass. A grass with terete stems, 1-2½ ft. high, with involute leaves, and with a few-flowered panicle, often reduced to a raceme, the few short branches erect or ascending. Spikelets 5-8-flowered, on short stiff pedicels; lemma sparsely clothed with stiff hairs, broadly oblong, its teeth triangular, the bent awn longer than the body of the lemma.

In dry or rocky soil. June-August. General.

2. **Danthonia comprèssa** Aust. Flattened Wild-oat-grass. A grass with simple, erect, slender, flattened stems, often decumbent at the base, 1½-3 ft. high, and an open panicle the lower branches generally spreading. Spikelets 5-10-flowered; lemma oblong, with aristate teeth, a ring of short hairs at the base, and an erect or somewhat bent and twisted awn.

In dry woods. July-September. Portage County.

16. **Arrhenathèrum** Beauv. Oat-grass.

Tall perennials with flat leaf-blades and long narrow panicles. Spikelets 2-flowered, the lower staminate, the upper bisporangiate, rachilla extending beyond the flowers; empty glumes thin-membranous, keeled, acute, unequal; lemmas rigid, 5-7-nerved, the first bearing a long bent, twisted, dorsal awn arising below the middle, the second unawned; palea hyaline, 2-keeled; grain free, ovoid.

1. **Arrhenatherum elàtius** (L.) Beauv. Oat-grass. A grass with a simple erect stem, 2-4 ft. high, and a narrow, shining, pale or

purplish panicle, the short branches verticillate and usually spikelet-bearing from the base. Lemma scabrous, the awn of the staminate flower about twice the length of its body.

A grass cultivated to some extent for hay. In fields and waste places. June, July. From Europe. Hamilton County.

17. *Trisetum* Pers. False-oats.

Tufted perennial grasses with spike-like or open panicles. Spikelets 2-5-flowered, rachilla prolonged beyond the flowers; empty glumes unequal, keeled; lemma 2-toothed, keeled, bearing a dorsal awn; palea narrow, 2-toothed; grain free, enclosed in the flowering glumes.

1. *Trisetum pennsylvanicum* (L.) Beauv. Marsh False-oats. A grass with an erect, slender, often weak stem, 1-3 ft. high, and with a narrow or sometimes loose and nodding yellowish panicle, the branches ascending. Spikelets 2-flowered; lemma of the lower flower with a small awn; lemma of the upper flower with a long, bent and twisted awn.

In swamps and wet meadows. June, July. No specimens.

18. *Avena* L. Oats.

Annual or perennial grasses with terminal panicles of large spikelets. Spikelets 2-many-flowered, rachilla bearded below the flowers; empty glumes subequal, membranous, many-nerved; lemmas indurated toward the base, generally bearing a dorsal awn; palea narrow, 2-toothed; grain often adherent to the flowering glumes.

1. Empty glumes much shorter than the spikelets; flowers with a circle of short bristles around the base; perennials. *A. torreyi*.

1. Empty glumes as long or longer than the spikelets exclusive of the awns; annuals. 2

2. Lemmas pubescent with long bristles; awns long and stiff. *A. fatua*.

2. Lemmas glabrous; awn comparatively short and weak, or absent. *A. sativa*.

1. *Avena torreyi* Nash. Purple Oats. A perennial grass with an erect simple slender stem, 1-2 ft. high, and a lax panicle, the branches erect or ascending, naked below. Spikelets 3-6-flowered; lemma scabrous, strongly nerved, with a ring of short hairs at the base, and with an awn as long as its body or longer.

In woods. July, August. Franklin County.

2. *Avena sativa* L. Common Oats. An annual glabrous grass with a hollow stem, 1-4 ft. high, and a loose ample panicle with ascending branches. Spikelets about 1 inch long; lemma glabrous, awnless or with a small straight awn slightly twisted at the base.

Extensively cultivated for its grain and straw. Persisting in fields and along roads and railways. June, July. Rather general. Escaped from cultivation.

3. *Avena fátua* L. Wild Oats. An annual grass with a stout simple erect stem, 1-4 ft. high, and an open panicle with ascending branches. Spikelets pendulous; empty glumes smooth, lemma pubescent with long rigid brown hairs and a ring of hairs at the base, its long stiff awn inserted about the middle and bent and twisted. A weed.

In fields and waste places. July, August. From Europe. No specimens.

19. *Deschampsia* Beauv. Hair-grass.

Tufted perennial grasses with flat or involute leaves and contracted or open panicles of shining spikelets. Spikelets 2-flowered, the hairy rachilla extended beyond the flowers or rarely ending in a staminate one; empty glumes keeled, acute, membranous; lemmas thin, 4-nerved, the midnerve becoming an awn, toothed at the apex; palet narrow, 2-nerved; grain free enclosed in the flowering glumes.

1. *Deschampsia flexuòsa* (L.) Trin. Wavy Hair-grass. A glabrous grass with an erect slender simple stem, 1-2½ ft. high, sheaths much shorter than the internodes, involute setaceous leaves, and an open panicle with erect, ascending or widely spreading, flexuous branches naked at the base. Lemma acutely toothed at the apex and with a twisted bent awn inserted near its base.

In dry places. July, August. Portage County.

20. *Aspris* Adans. Hair-grass.

Small, delicate annuals with narrow leaf-blades and contracted or open panicles. Spikelets small, 2-flowered, both flowers perfect; empty glumes thin-membranous, subequal, acute; lemmas hyaline, 2-toothed, bearing a delicate dorsal awn arising below the middle; palet hyaline, 2-nerved; grain enclosed in the flowering glumes and usually adherent to them.

1. *Aspris caryophýllea* (L.) Nash. Silvery Hair-grass. A delicate glabrous annual grass with erect stems, ½-1 ft. high, involute setaceous leaves, and an open, silvery, shining panicle. Spikelets clustered toward the ends of the capillary branches; lemma with a bent awn, very acute, 2-toothed.

In fields and waste places. May-July. From Europe. Lake County.

21. **Nothohólcus** Nash. Velvet-grass.

Perennial grasses with densely flowered terminal panicles. Spikelets 2-flowered articulated below the empty glumes, the lower flower perfect, the upper staminate; empty glumes membranous, keeled, the outer 1-nerved, the inner 3-nerved and often short-awned; lemmas chartaceous, that of the upper flower bearing a bent awn; palet narrow, 2-keeled, grain free, enclosed in the glumes.

1. **Nothoholcus lanatus** (L.) Nash. Velvet-grass. A light green, perennial, densely and softly pubescent grass with erect simple stems, often decumbent at the base, 1-3 ft. high, and a narrow purplish panicle. Spikelets nearly as broad as long; lemmas ciliate at the apex, that of the second flower with a hook-like awn.

In fields, meadows and waste places. June-August. Lake, Trumbull, Cuyahoga, Lorain, Erie, Wayne, Fairfield. From Europe.

Tribe, **Hordeae.** Barley Tribe.

Grasses with laterally compressed, 2-several-flowered spikelets jointed above the empty glumes and arranged on opposite sides of a jointed rachis forming equilateral spikes; spikelets sometimes with but 1 perfect flower and a mere vestige of the second; leaf-blades with a pair of more or less well-developed appendages at the base.

22. **Lolium** L. Darnel.

Annual or perennial grasses with simple erect stems, flat leaves, and terminal spikes. Spikelets several-flowered, solitary, with the edge turned toward the rachis; empty glumes rigid; lemmas rounded on the back, 5-7-nerved, awned or awnless; palet 2-keeled; grain adherent to the palet.

1. Outer empty glume shorter than the spikelet; short-lived perennials. 2
1. Outer empty glume as long or longer than the spikelet; lemmas awned or awnless; annuals. *L. temulentum.*
2. Lemmas awnless. *L. perenne.*
2. Lemmas, at least the upper ones, awned. *L. multiflorum.*

1. **Lolium perenne** L. Red Darnel. A short-lived perennial grass with an erect, simple stem, $\frac{1}{2}$ -2 $\frac{1}{2}$ ft. high, and a flat spike. Spikelets 5-10-flowered; lemma obscurely nerved, acuminate, awnless. Cultivated as a pasture grass and also used for hay.

In cultivated fields and roadsides. Also called ray-grass and rye-grass. June-August. Rather general. From Europe.

2. **Lolium multiflorum** Lam. Awned Darnel. A short-lived perennial grass with tufted stems, roughened below and in the inflorescence, 2-3 ft. high, and with a loose spike of 20-30 spikelets. Spikelets 10-20-flowered; lemma awned. Cultivated for hay.

In fields and roadsides. Also called Italian rye-grass. June, July. From Europe. Hamilton, Madison.

3. **Lolium temulentum** L. Poison Darnel. An annual glabrous grass with simple, erect stems, 2-4 ft. high, and a flat, coarse spike. Spikelets 5-7-flowered; outer empty glume equalling or exceeding the spikelet; lemma obscurely nerved, awned or awnless. The grain of this grass is said to be poisonous.

In waste and cultivated fields; often a troublesome weed. June-August. No specimens. From Europe.

23. **Agropyron** J. Gaertn. Couch-grass, Wheat-grass.

Perennial grasses with simple stems and terminal spikes. Spikelets 3-many-flowered, solitary in the notches of the rachis, the side

of the spikelet turned toward the rachis; empty glumes equal, usually rigid, several-nerved, acute or awned; lemma rounded on the back, rigid, 5-7-nerved, usually acute or awned; palet 2-keeled, the keels bristly ciliate; grain usually adherent to the palet.

1. Lemma awn-pointed or with an awn usually not more than $\frac{1}{2}$ as long as the body; stems from creeping rhizomes. *A. repens.*
1. Lemma with an awn about twice as long as its body; stems tufted, without creeping rhizomes. *A. caninum.*

1. **Agropyron rèpens** (L.) Beauv. Couch-grass. A perennial, usually glaucous grass with stem 1-4 $\frac{3}{4}$ ft. high, from a long, jointed, running rhizome, and with a strict spike. Spikelets 3-7-flowered; lemma glabrous or more or less scabrous, strongly nerved, acute or short awned at the apex. Often a bad weed. Frequently infested with ergot. The rhizome is used in medicine.

In fields, roadsides, and waste places. Also called Quitch-grass. July, August. Rather general; no specimens from the southeastern part of the state. From Europe.

2. **Agropyron caninum** (L.) R. & S. Awned Wheat-grass. A perennial grass with simple, erect stems, 1-3 ft. high, and more or less nodding spikes. Spikelets 3-6-flowered; empty glumes awn-pointed or bearing an awn; lemma 3-5-nerved, usually scabrous toward the apex, bearing an awn sometimes twice the length of its body.

In cultivated grounds and meadows. July-September. Portage County. From Europe.

24. **Tríticum** L. Wheat.

Tall annual grasses with flat leaves, with spikelets single at the nodes of the spike, and with their sides turned to the rachis. Spikelets 2-6-flowered; empty glumes rather broad; lemma rounded on the back, many-nerved ending in one or more points or awns; palet 2-keeled; grain with a deep groove, hairy at the apex, free.

1. **Triticum aestivum** L. Wheat. An annual grass with erect hollow stems, 1-5 ft. high, and compact terminal spikes. Spikelets 3-6-flowered; lemma awned or awnless. Cultivated in numerous spring and winter varieties for its grain and straw.

In fields and waste places, especially along railways. June, July. Erie, Belmont, Harrison, Tuscarawas, Morrow, Fayette, Madison, Preble, Franklin. Escaped from cultivation.

25. **Secàle** L. Rye.

Tall annual grasses with flat leaves and simple stems, with the spikelets single at the nodes of the spike, and with their sides to the rachis. Spikelets usually with 2 perfect flowers; empty glumes

lanceolate, awn-pointed; lemma keeled, the keel hispid-ciliate, awned; palet 2-keeled; grain with a deep groove, hairy at the apex, free.

1. **Secale cereale** L. Rye. A tall, light green, annual grass with slender, erect, hollow stems, 2-6 ft. high, and more or less nodding, terminal spikes. Spikelets 2-3-flowered; lemma sharply keeled, awned. Cultivated as a winter annual for its grain and straw, and for temporary pasturage. The grain is sometimes infested and distorted by ergot.

In cultivated fields and waste places, especially along railways. May-July. Erie, Morrow, Franklin, Scioto. Escaped.

26. **Elymus** L. Wild-rye.

Tall, erect tufted perennials with flat leaves and dense terminal spikes. Spikelets 2-several-flowered, sessile, usually in pairs, sometimes in threes; empty glumes equal, rigid, narrow, 1-3-nerved, acute or awned; lemma convex, obscurely 5-nerved, usually with an awn; palet 2-keeled, a little shorter than the lemma; grain adherent to the palet.

- | | |
|--|--------------------------|
| 1. Empty glumes narrowly lanceolate; spike stout. 2 | |
| 1. Empty glumes narrowly awl-shaped; spike and stem slender. | <i>E. striatus.</i> |
| 2. Lemma glabrous; spike erect, empty glumes indurated. | <i>E. virginicus.</i> |
| 2. Lemma more or less pubescent. 3 | |
| 3. Spike erect; empty glumes indurated below. | <i>E. hirsutiglumis.</i> |
| 3. Spike nodding, empty glumes not indurated below. | <i>E. canadensis.</i> |

1. **Elymus virginicus** L. Virginia Wild-rye. A dark yellow-green grass with stout, erect, simple stems, 2-5 ft. high, and thick, rigidly upright spikes, often included at the base in the uppermost inflated sheath. Spikelets 2-3-flowered; lemma smooth, bearing a rough awn. Extensively infested with ergot.

In moist soil, especially in ravines and along streams. July, August. General.

2. **Elymus hirsutiglumis** Scrib. Strict Wild-rye. A grass with an erect stem, 2-3 ft. high, and a stout, erect spike, the rachis pubescent. Spikelets crowded, in pairs, 2-5-flowered; lemma 5-nerved, lanceolate, appressed-hirsute, long acuminate into a rough awn.

On river banks and moist places. July, August. Ottawa, Huron.

3. **Elymus canadensis** L. Nodding Wild-rye. A light green or usually glaucous grass with simple erect stems, 2-7¼ ft. high, and a broad, stout, compact, nodding spike interrupted below, its peduncle much exerted. Spikelets divergent from the rachis, 3-5-flowered; lemma hirsute with a long, spreading awn. Often infested with ergot.

In sandy soil and moist ground. July, August. Rather general.

4. **Elymus striatus** Willd. Slender Wild-rye. A more or less pubescent grass with simple, slender, erect stems, 2-3 ft. high, and slender, dense, sometimes nodding spikes. Spikelets 1-3-flowered, divergent from the rachis; lemma hirsute, bearing a slender, rough awn. Sometimes infested with ergot.

In woods and on banks. June, July. Wayne, Erie, Auglaize.

27. **Hýstrix** Moench. Bottle-brush-grass.

Usually tall perennials with simple stems, flat leaves, and loosely flowered terminal spikes. Spikelets 2-several-flowered, in pairs, rarely in 3's at each node of the rachis; empty glumes vestigial; lemmas narrow, rigid, rounded on the back, 5-nerved, awned; palet 2-keeled; grain adherent to the palet when dry.

1. **Hystrix hýstrix** (L.) Millsp. Bottle-brush-grass. A grass with simple erect stems, 2-4 ft. high, and short exserted or partially included lax spikes. Spikelets usually distant, at length widely divergent; lemma more or less pubescent, acuminate into an awn about 1 in. in length.

In rocky woods. June, July. General.

28. **Hórdeum** (Tourn.) L. Barley.

Tufted annual or perennial grasses with terminal spikes, which disarticulate at maturity. Spikelets with one perfect flower, rarely 2-flowered, usually in 3's at each joint of the rachis, the middle one sessile and perfect, the lateral ones pediceled and usually reduced; empty glumes equal, rigid, narrow or setaceous; lemma obscurely 5-nerved, awned; palet slightly shorter, the two keels near the margin; grain usually adherent to the palet at maturity.

1. With 3 fertile spikelets at each joint of the rachis; lemma with an awn 4-6 in. long. *H. vulgare.*
1. With 1 fertile and 2 lateral, more or less vestigial spikelets at each joint of the rachis. 2
2. Spike flat; awn of the lemma enclosing the fertile flower 4-6 in. long. *H. distichum.*
2. Spike not decidedly flattened, awn 3 in. or much less in length. 3
3. Awns $\frac{1}{2}$ in. or less in length. *H. nodosum.*
3. Awns 1-3 in. long, the whole spike appearing like a brush. *H. jubatum.*

1. **Hordeum vulgare** L. Common Barley. An annual grass with simple erect hollow stems, 1-3 ft. high, and dense terminal spikes. Spikelets 3 at a joint of the rachis each with a perfect flower; lemma usually with a coarse long awn which breaks readily. Cultivated for its grain.

In fields and waste places, especially along railways. June, July. Franklin, Tuscarawas, Portage. Escaped from cultivation.

2. **Hordeum distichum** L. Two-rowed Barley. An annual grass like *Hordeum vulgare* but with the 2 lateral spikelets at each node of the rachis vestigial and containing vestigial flowers.

Cultivated for its grain, usually mixed with *H. vulgare*. In fields and waste places. June, July. Escaped in Lake and Erie Counties.

3. **Hordeum nodosum** L. Meadow Barley. An annual grass with erect or sometimes decumbent stems, $\frac{1}{2}$ -2 ft. high, and erect spikes. Spikelets 3 at a node of the rachis, the central one with a perfect flower, the lateral ones with staminate or vestigial flowers; lemmas awned.

In thin dry soils and waste places. May, June. Hamilton County.

4. **Hordeum jubatum** L. Squirrel-tail Barley. A biennial grass with simple, erect, usually slender stems, $\frac{1}{2}$ -2 $\frac{1}{2}$ ft. high, and a nodding, densely awned spike. Spikelets in 3's, the central one containing a perfect flower, the lateral ones vestigial; empty glumes awn-like; lemma with an awn as long as the empty glumes; all the awns scabrous and very slender.

A weed. In dry soil and waste ground. June-August. From Lake to Lucas County; also in Franklin, Madison, Greene, Allen, Defiance and Williams. Naturalized from the West.

Tribe, **Chlorideae**. Chloris Tribe.

Grasses with 1-several-flowered, laterally compressed spikelets, jointed above the empty glumes and borne in 2 rows on one side of a continuous axis, forming spikes which are digitately or paniculately arranged, or sometimes solitary.

29. **Spartina** Schreb. Slough-grass.

Coarse perennial glabrous grasses with strong horizontal rhizomes, rigid stems, long tough leaves, and an inflorescence of one-sided spreading or erect alternate spikes. Spikelets 1-flowered, flattened laterally, borne in two rows on the rachis; empty glumes unequal, keeled, acute or bristle-pointed; lemma obtuse, 1-nerved; palet equaling or exceeding the lemma, 2-nerved; grain free.

1. **Spartina michauxiàna** Hitch. Tall Slough-grass. A coarse grass with a simple erect stem, 2-10 ft. high, with an inflorescence of 5-20 spike-like branches. Leaves with a scabrous cutting edge. Spikelets much imbricated; lemma glabrous except the serrulate-scabrous midnerve which terminates abruptly below the emarginate or 2-toothed apex.

Used for thatching and in making coarse mats. In swamps and streams of fresh or brackish water, in wet ravines, and even sand dunes. August-October. Rather general; no specimens from the central, eastern nor from the southwestern counties.

30. **Beckmànnia** Host. Beckmannia.

A tall, erect perennial grass with flat leaf-blades and erect spikes borne in a terminal panicle. Spikelets 1-2-flowered, globose, laterally compressed, closely imbricated in two rows along one side of a continuous rachis; empty glumes subequal, inflated, boat-shaped, chartaceous, with scarious margins; lemma narrow, lanceolate, thin-membraneous; palet hyaline, 2-keeled; grain free, enclosed in the lemma and palet.

1. **Beckmannia erucaefórmis** (L.) Host. Beckmannia. A glabrous grass with flattened wiry stems, 1½-3 ft. high, and a panicle of appressed spikes. Spikelets nearly circular in outline, closely imbricated in 2 rows on the rachis; empty glumes transversely wrinkled; lemma with an acuminate apex.

In wet ground. July-September. Cuyahoga County.

31. *Capriola* Adans. Bermuda-grass.

Low diffusely branched, extensively creeping perennials, with flat leaf blades and slender spikes digitately arranged at the apex of upright branches. Spikelets 1-flowered, laterally compressed, sessile, in two rows along one side of a slender continuous axis; empty glumes unequal, narrow, keeled; lemma broad, boat-shaped, ciliate on the keel; palet 2-keeled, hyaline; grain free.

1. ***Capriola dactylon* (L.) Ktz.** Bermuda-grass. A glabrous grass with flattened, wiry, erect stems, $\frac{1}{4}$ -1 ft. high, from long creeping branched stolons, and a digitate inflorescence of 4-5 spikes. Spikelets imbricated; lemma broad and boat-shaped, longer than the empty glumes.

In fields and waste places. Cultivated in the south for pasture. July-Sept. No specimens. From Europe.

32. *Eleusine* Gaertn. Yard-grass

Coarse tufted annuals or perennials with stout unilateral spikes, digitate or approximate at the summit of the stem. Spikelets several-flowered, sessile, closely imbricated in two rows along one side of a continuous rachis which is not extended beyond them; empty glumes unequal, shorter than the flowers, scabrous on the keel; lemma with a thickened 5-ribbed keel; palet shorter, acute, the narrowly winged keels distant; grain black, loosely enclosed in the lemma and palet.

1. ***Eleusine indica* (L.) Gaert.** Yard-grass. A glabrous tufted grass with flattened erect or decumbent stems, $\frac{1}{2}$ -2 ft. high, and an inflorescence of 2-10, more or less digitately arranged spikes. Spikelets appressed, 3-6-flowered; lemma with a thickened 5-ribbed keel. A weed.

In yards, sidewalks, and waste places. June-September. General. Naturalized.

33. *Atheropogon* Muhl. Grama-grass.

Perennial grasses with solid stems, narrow flat leaf-blades, and an inflorescence composed of numerous, short, scattered, one-sided, spreading or reflex spikes. Spikelets 1-flowered, crowded in two rows; empty glumes unequal, acute, narrow, keeled; lemma 3-toothed; palet narrow, hyaline, 2-toothed; grain free, enclosed in the flowering glumes.

1. ***Atheropogon curtipendulus* (Mx.) Fourn.** Tall Grama-grass. A gray-green grass with simple, solid, erect stems, 1- $1\frac{1}{2}$ ft. high and a long slender raceme of 15-20 spreading or reflexed spikes

whose rachis is bifid at the apex. Spikelets 4-12 on each branch; lemma scabrous, ending in 3 short awns; sterile lemma with 2 acute lobes and 3 straight awns.

A valuable hay and pasture grass. In dry soil. July-Sept. Lake, Erie, Ottawa, Franklin, Adams.

34. *Bouteloua* Lag. Mesquite-grass.

Annual or perennial usually gray-green grasses with narrow, flat, or convolute leaves and numerous spikelets in 1-sided spikes. Spikelets 1-2-flowered, arranged in two rows on one side of a flat rachis and bearing 1-3 awns and 1-3 rudimentary glumes; empty glumes unequal, keeled; lemma 3-5-nerved, 3-toothed, the teeth awn-pointed or awned; palet hyaline, 2-keeled, 2-toothed; grain free.

1. Rachilla glabrous; inner empty glume strongly papillose-hispid on the keel. *B. hirsuta*.
1. Rachilla with a tuft of hairs; inner empty glume scabrous and sometimes sparingly long-ciliate on the keel. *B. oligostachya*.

1. *Bouteloua hirsuta* Lag. Hairy Mesquite-grass. A gray-green grass with erect stems $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high, leafy at the base, and with an inflorescence of 1-4 erect or ascending spikes whose rachis extends beyond the spikelets as a conspicuous point. Spikelets numerous; outer empty glume setaceous, the inner conspicuously tuberculate-hirsute on the keel; fertile lemma pubescent, 3-cleft, the divisions awn-pointed; rachilla without a tuft of hairs under the vestigial glumes and awns.

A valuable pasture grass in the West. In dry soil, especially on prairies. July-Sept. Waifs in Franklin County.

2. *Bouteloua oligostachya* (Nutt.) Torr. Smooth Mesquite-grass. A gray-green grass with erect, simple stems, $\frac{1}{2}$ -2 $\frac{2}{3}$ ft. high with involute curly leaves, and with an inflorescence of 1-3 spikes often strongly curved, the rachis terminating in a short inconspicuous point. Spikelets numerous, outer empty glume hyaline, shorter than the membranous inner one which is scabrous and sometimes long-ciliate on the keel or with a few papillae; fertile lemma pilose, 3-cleft, the divisions short-awned; sterile lemma consisting of two truncate lobes and three equal awns with a tuft of long hairs at the base.

A valuable pasture grass in the West. On dry prairies. July-Sept. Waifs in Franklin County.

Tribe, **Agrostideae.** Bent-grass Tribe.

Grasses with more or less laterally compressed spikelets jointed above the empty glumes and arranged in panicles or racemes; spikelets 1-flowered, the rachilla sometimes prolonged behind the palet into a naked or plumose bristle.

35. **Sporóbolus** R. Br. Rush-grass, Dropseed.

Perennial or rarely annual grasses with flat or convolute leaves and open or contracted panicles, our species with a peculiar constriction about the middle of the leaf blade. Spikelets usually small, 1-flowered, awnless; empty glumes usually unequal, membranous; lemma 1-nerved, equaling or longer than the empty ones; palet 2-nerved, often splitting at maturity; grain free, readily falling from the spikelet.

1. Panicle contracted. 2
1. Panicle open, its branches spreading; stems tufted; perennials. 5
2. Lemma pubescent. 3
2. Lemma glabrous. 4
3. Panicle 2-5 in. long, its branches 1-2 in. long; palet long-acuminate; perennial. *S. clandestinus.*
3. Panicle 1-2 in. long, its branches $\frac{1}{2}$ in. long or less; palet long-acute; annual. *S. vaginæflorus.*
4. Panicle 3-10 in. long; sheaths cylindric; palet obtuse; perennial. *S. asper.*
4. Panicle 1-2½ in. long, sheaths inflated; palet acute; annual. *S. neglectus.*
5. Spikelets $\frac{1}{8}$ in. long or less; empty glumes ovate to lanceolate, leaf sheaths densely pilose at the throat. *S. cryptandrus.*
5. Spikelets nearly $\frac{1}{4}$ in. long; outer empty glumes subulate, leaf sheaths glabrous or sparingly pilose at the summit. *S. heterolepis.*

1. **Sporobolus áper** (Mx.) Kunth. Longleaf Rush-grass. A perennial grass with stout, erect, simple or occasionally branched stems, 1½-3½ ft. high and terminal linear panicles, partly included in the inflated upper sheath. Lemma glabrous, acutish or obtuse.

In dry sandy soil. Aug., Sept. Lake, Erie, Franklin.

2. **Sporobolus vaginaeflòrus** Torr. Sheathed Rush-grass. An annual grass with tufted, slender stems, $\frac{1}{2}$ -1½ ft. high, and numerous panicles partly included in the inflated sheath, the terminal one exserted. Lemma acuminate, scabrous, shorter than the sharp-pointed palet.

In dry soil. Aug., Sept. Auglaize, Madison, Warren, Vinton, Athens.

3. **Sporobolus negléctus** Nash. Small Rush-grass. An annual grass with erect slender often much branched, usually decumbent

stems, $\frac{1}{2}$ -1 ft. high, with inflated sheaths, and with the terminal panicle usually more or less included in the upper sheath, the lateral panicles enclosed in the sheaths. Lemma acute, glabrous, about equalling the acute palet.

In dry and sandy soil. Aug., Sept. Cuyahoga, Wayne, Huron, Auglaize.

4. **Sporobolus cryptándrus** (Torr.) Gr. Sand Dropseed. A perennial tufted grass with erect, simple stems, $1\frac{1}{2}$ - $3\frac{1}{2}$ ft. high, or sometimes branched at the base, and with an ample lead-colored, usually open panicle included at the base in the upper sheath. Leaves long-acuminate with a peculiar joint-like constriction about the middle of the blade and a ring of long white hairs at its base. Lemma acute, longer than the palet.

In sandy soil. Aug.-Oct. Lucas, Ottawa, Erie, Lorain.

5. **Sporobolus heterólepis** Gr. Northern Dropseed. A tufted perennial grass with rather stout, wiry, erect stems, 1-3 ft. high, and long exserted panicles with ascending branches. Lemma glabrous, obtuse or subacute.

In dry soil. Aug., Sept. Franklin, Madison, Champaign.

36. **Calamagróstis** Adans. Reed Bent-grass.

Tall often reed-like perennial grasses with flat leaf-blades, running rhizomes, and panicles with many spikelets. Spikelets 1-flowered, rachilla prolonged behind the flower into a hairy bristle or pedicle; empty glumes subequal, keeled, membranous; lemma awned on the back, surrounded at the base with copious long hairs; palet shorter than the lemma, 2-nerved; grain free, enclosed in the flowering glumes.

1. Prolongation of the rachilla hairy its whole length; awn straight; panicle open, its branches spreading or ascending, usually loosely flowered. *C. canadensis*.
1. Prolongation of the rachilla hairy only at the summit; panicle contracted, its branches erect. *C. cinnoides*.

1. **Calamagrostis canadénsis** (Mx.) Beauv. Bluejoint Reed Bent-grass. A large grass with clustered, simple or somewhat branched, erect, hollow stems, 2-5 ft. high, and a loose, usually purplish panicle, the slender fascicled branches erect or ascending. Spikelets with copious hairs on the callus, about as long as the flowering glumes, and surrounding them; lemma thin, erose-truncate, bearing a delicate awn on the back.

An important and valuable meadow grass, good for forage and hay. In swamps and wet soils. July-Sept. Northern Ohio, as far south as Stark, Franklin, and Auglaize Counties.

2. **Calamagrostis cinnoides** (Muhl.) Scrib. Nuttall's Reed Bent-grass. A glaucous grass with stout, erect, simple stems, 3-5 ft. high, and contracted panicles with erect branches. Lemma acuminate, awned above the middle; callus-hairs about one-half the length of the flowering glumes; prolongation of the rachilla bearing a tuft of terminal hairs.

In moist soil. July, Aug. No specimens.

37. **Agróstis** L. Bent-grass.

Annuals or perennials with flat or bristle-like leaves, membranous ligules, and open or contracted panicles. Spikelets 1-flowered; empty glumes subequal, membranous, keeled, acute; lemma broad, obtuse, awnless or dorsally awned; palet hyaline, shorter than the lemma, sometimes minute or wanting; grain free, loosely inclosed in the lemma.

1. Lemma with a prominent dorsal awn just above the middle; palet minute or none. *A. canina.*
1. Lemma awnless or rarely with a short awn. 2
2. Palet conspicuous, at least half as long as the lemma, 2-nerved; panicle open. *A. alba.*
2. Palet inconspicuous, minute and nerveless or wanting. 3
3. Stems weak, decumbent or prostrate at the base; leaves lax. *A. schweinitzii.*
3. Stems and leaves erect. 4
4. Branches of the panicle not elongated, usually branching at or below the middle. *A. perennans.*
4. Branches of the diffuse panicle long and capillary, usually branching above the middle. *A. hyemalis.*

1. **Agrostis álba** L. Red-top (Bent-grass). A perennial grass with erect or decumbent stems, $\frac{1}{2}$ -2 $\frac{1}{2}$ ft. high, with creeping rhizomes or stoloniferous, and with a contracted or open usually purplish panicle, the branches verticillate and ascending. Lemma nearly equaling the empty glumes, 3-nerved, rarely short-awned.

An important and valuable grass, extensively cultivated for pasture and hay. In fields and meadows. July-Sept. General. From Europe.

2. **Agrostis schweinitzii** Trin. Thin Bent-grass. A perennial grass with weak, slender, simple or sparingly branched stems, 1-2 $\frac{1}{2}$ ft. high, from a decumbent or prostrate base, and with an open panicle with widely spreading branches. Lemma shorter than the acuminate unequal empty glumes; palet small or wanting.

In damp shaded places. July-Sept. Rather general.

3. **Agrostis hyemàlis** (Walt.) B. S. P. Rough Bent-grass. A perennial grass with very slender simple erect stems, 1-2 ft. high, and loose purplish panicles, the whorled capillary branches spikelet-

bearing at the ends. Lemma awnless or rarely short-awned on the back, palet very small or obsolete.

In dry or moist sandy or stony soil. June-Aug. Rather general, but no specimens from the northwestern nor southeastern counties.

38. *Apèra* Adans. Windlestraw.

Annual grasses with flat narrow leaves and diffuse panicles. Spikelets 1-flowered, small, the rachilla prolonged beyond the flower into a bristle; empty glumes subequal, thin, keeled, acute; lemma membranous bearing a slender awn just below the 2-toothed apex; palet nearly as long as the lemma, 2-keeled, 2-toothed; grain narrow, free.

1. *Apera spica-vénti* (L.) Beauv. Silky Windlestraw. A grass with tufted slender erect simple stems, 1-2 ft. high, and an open panicle with verticillate capillary ascending branches, spikelet-bearing near the ends. Spikelets shining; lemma scabrous, bearing a dorsal awn.

In waste places. June, July. From Europe. Lake County.

39. *Cínna* L. Wood Reed-grass.

Tall perennial grasses with flat leaf-blades, conspicuous hyaline ligules, and many-flowered nodding panicles. Spikelets 1-flowered, the rachilla articulated below the empty glumes and prolonged behind the palet into a minute bristle; empty glumes narrow, keeled, acute; lemma 3-5-nerved, short-awned from between the 2 minute teeth of the apex; palet 1- or 2-nerved, the nerves close together; stamen 1; grain narrow, free, enclosed in the flowering glumes.

1. *Cinna arundinàcea* L. Wood Reed-grass. A tall grass with erect, simple, often solitary stems, 2-5 ft. high, rather broad leaf blades and a contracted panicle with slender ascending branches. Lemma scabrous, usually bearing a minute awn from the 2-toothed apex.

In moist woods and shaded swamps. Aug., Sept. General.

40. *Ammóphila* Host. Beach-grass.

Coarse perennial grasses with long, creeping rhizomes, flat leaf-blades, which are deeply grooved above and convolute on drying, and with dense spike-like panicles. Spikelets 1-flowered, the rachilla prolonged beyond the flower and hairy; empty glumes firm, compressed-keeled, acute, the outer 1-nerved, the inner 3-nerved; lemma 5-nerved, with short hairs at the base, 2-toothed and mucronate be-

tween the teeth; palet rather firm, its two nerves close together; grain free, loosely enclosed in the flowering glumes.

1. **Ammophila arenària** (L.) Link. Sand Beach-grass. A glabrous grass with erect, rigid, stout stems, 2-4 ft. high, from long horizontal branching rhizomes, and with a dense, spike-like, compressed panicle. Lemma scabrous, usually with a minute awn just below the apex.

On sandy beaches of the sea coast and the Great Lakes. July, Aug. Erie County.

41. **Alopecùrus** L. Foxtail.

Branching annual or perennial grasses with flat leaves, erect or decumbent stems, and soft dense spike-like panicles. Spikelets 1-flowered, flattened, falling from the axis entire; empty glumes usually somewhat united at the base, keeled; lemma broad, obtuse, 5-nerved, with a slender dorsal awn on the back; palet usually none.

1. Lemma shorter than the obtuse, long-ciliate empty glumes; empty glumes less than $\frac{1}{8}$ in. long. *A. geniculatus.*

1. Lemma as long as the acute long-ciliate empty glumes; empty glumes $\frac{1}{8}$ - $\frac{1}{4}$ in. long. *A. pratensis.*

1. **Alopecurus geniculàtus** L. Marsh Foxtail. A grass, usually glabrous, with slender, decumbent stems, simple or sparingly branched, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high, and a slender spike-like panicle. Lemma obtuse, glabrous, with an awn inserted about one-fourth above its base.

In wet soil. June-Aug. Lake, Ottawa, Crawford, Auglaize, Madison, Franklin, Perry. Introduced.

2. **Alopecurus praténsis** L. Meadow Foxtail. A glabrous grass with slender, simple, erect stems, 1-2 $\frac{1}{2}$ ft. high, from short, creeping rhizomes, and with a spike-like panicle. Empty glumes united at the base for about one-fourth of their length; lemma obtuse, its awn inserted about one-fourth above the base.

In meadows and pastures. May, June. No specimens. From Europe.

42. **Heleóchloa** Host. Cat-tail-grass.

Low tufted branching annuals or perennials with flat leaves and numerous spike-like panicles partly included in the inflated sheaths. Spikelets 1-flowered, flattened; empty glumes subequal, membranous, acute, ciliate keeled; lemma 1-nerved; palet shorter, 2-nerved; grain free, oblong, loosely enclosed in the flowering glumes.

1. **Heleochoa schoenòides** (L.) Host. Cat-tail-grass. A low, cespitose, glabrous annual, usually almost prostrate, with branched

stems, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. long, and with dense, oblong-ovoid, spike-like panicles.

In waste places. July, Aug. Greene County. From Europe.

43. *Phlèum* L. Timothy.

Erect simple-stemmed perennials with flat leaves and dense, spike-like panicles. Spikelets 1-flowered, flattened; empty glumes membranous, compressed, keeled, abruptly awn-pointed; lemma broad, truncate, hyaline, 5-nerved; palet narrow, hyaline; grain ovoid, free, enclosed in the flowering glumes.

1. *Phleum pratense* L. Timothy. A glabrous grass with simple, hollow, erect stems, 1-5 ft. high, from a swollen base, and with a long-cylindrical, compact, spike-like panicle. Empty glumes short-awned, ciliate on the keel; lemma 5-nerved, truncate, hyaline. A very important grass extensively cultivated for hay.

In fields and meadows. Also called herd-grass. June-Aug. General. From Europe.

44. *Muhlenbergia* Schreb. Muhlenbergia.

Mostly perennial grasses with flat or involute leaves and small spikelets usually in contracted panicles, and usually with scaly rhizomes. Spikelets 1-flowered, usually with a short barbate callus below the flower; empty glumes membranous or hyaline, acute, sometimes awned; lemma narrow, 3-nerved, awned or awnless; palet thin, 2-keeled; grain narrow, free, tightly enclosed in the flowering glumes.

1. Lemma not awned, but the empty glumes may be short awned. 2
1. Lemma long-awned, awn mostly twice as long as the body of the lemma. 4
2. Empty glumes not awned, broadly ovate, acute, about half as long as the lemma. *M. sobolifera*.
2. Empty glumes long acuminate or short awned, as long or longer than the lemma. 3
3. Empty glumes about equal in length to the lemma, long pointed. *M. mexicana*.
3. Empty glumes much longer than the lemma, usually about twice as long, short-awned; panicle usually dense. *M. racemosa*.
4. Empty glumes at least $\frac{1}{2}$ as long as the lemma. 5
4. Empty glumes not more than $\frac{1}{4}$ the length of the lemma, the outer one often wanting. *M. schreberi*.
5. Empty glumes lanceolate, about equaling the lemma. *M. umbrosa*.
5. Empty glumes broadly ovate, $\frac{1}{2}$ - $\frac{2}{3}$ as long as the lemma. *M. tenuiflora*.

1. *Muhlenbergia sobolifera* (Muhl.) Trin. Rock Muhlenbergia. A glabrous grass with erect or ascending, sparingly branched stems, 2-3 ft. high, with numerous conspicuous rhizomes covered with short, appressed scales, and with very slender, usually loose-flowered panicles. Lemma acute, scabrous, 3-nerved.

In rocky woods. Sept., Oct. Highland, Wayne.

2. *Muhlenbergia mexicana* (L.) Trin. Mexican Muhlenbergia. A glabrous grass with erect or often prostrate, much-branched stems, 2-4 ft. high, with numerous conspicuous rhizomes, covered with short appressed scales, and with a long contracted panicle, usually partly included within the upper sheath, its branches spike-like and erect or appressed. Lemma acuminate, scabrous, sometimes awned.

In swamps and borders of fields. Aug., Sept. General.

3. *Muhlenbergia racemosa* (Mx.) B. S. P. Marsh Muhlenbergia. A grass with erect, usually branched stems, 1-3 ft. high, with numerous conspicuous rhizomes covered with short, appressed scales, and with dense spike-like panicles, interrupted at the base, the branches erect or appressed. Empty glumes aristate; lemma acuminate, awnless, its midrib strongly scabrous.

In wet places. Aug.-Oct. Summit, Wayne, Huron, Wyandot, Champaign, Licking.

4. *Muhlenbergia umbrosa* Scrib. Wood Muhlenbergia. A grass with erect branched stems, 1-3 ft. high, with numerous conspicuous rhizomes, covered with short appressed scales, and with somewhat lax panicles, the branches erect or ascending. Lemma strongly scabrous, attenuate into a slender awn.

In moist woods and along streams. Aug.-Oct. Cuyahoga, Champaign.

5. *Muhlenbergia tenuiflora* (Willd.) B. S. P. Slender Muhlenbergia. A grass with slender, simple or sparingly branched stems, 2-3 ft. high, with numerous conspicuous rhizomes covered with short, appressed scales, and with a loosely flowered, slender panicle with appressed branches. Lemma scabrous, tapering into a slender awn.

In rocky woods and ravines. Aug., Sept. Portage, Wayne, Fairfield, Madison, Greene.

6. *Muhlenbergia schreberi* Gmel. Spreading Muhlenbergia. A diffusely much-branched grass with erect or ascending stems, 1-3 ft. high, from a decumbent base, often rooting at the lower nodes, and with slender, somewhat lax panicles, the erect branches rather densely flowered. Empty glumes minute, the outer one nearly obsolete; lemma strongly scabrous, tapering into a slender awn.

In dry woods, hillsides, and waste places. Aug., Sept. General.

45. *Brachyelytrum* Beauv. *Brachyelytrum*.

A tall perennial with flat leaves, simple stems from short knotty rhizomes, and a narrow, few-flowered panicle. Spikelets 1-flowered, narrow, the rachilla prolonged into a slender naked bristle; empty glumes minute, unequal; lemma rigid, 5-nerved, ending in a long

straight awn; palet rigid, 2-nerved; grain oblong, free, enclosed in the flowering glumes.

1. **Brachyelytrum erectum** (Schreb.) Beauv. *Brachyelytrum*. A grass with erect, slender, simple stems, 1-3 ft. high, with sparingly retrorse-hispid sheaths, and with slender, narrow panicles. Empty glumes unequal, the outer often obsolete; lemma 5-nerved with an erect awn.

In moist, rocky woods. July, August. Cuyahoga, Portage, Lorain, Wayne, Highland, Franklin, Madison, Hocking, Adams.

46. **Milium** L. Millet-grass.

Annual or perennial grasses with flat leaves and terminal open panicles. Spikelets 1-flowered; empty glumes equal; lemma shining, indurated, the margins inrolled; palet similar, scarcely shorter; grain free, tightly enclosed in the rigid, shining flowering glumes.

1. **Milium effusum** L. Tall Millet-grass. A glabrous perennial grass with erect, simple stems, 2-6 ft. high, and a lax panicle with long, slender, somewhat flexuous branches, in remote pairs or fascicles, spikelet-bearing from about the middle. Empty glumes equal; lemma smooth, white.

In woods. June, July. Lake, Cuyahoga, Lorain, Wayne, Stark.

47. **Oryzopsis** Mx. Mountain-rice.

Tufted perennial grasses with flat or convolute leaves and paniculate few-flowered inflorescences. Spikelets, 1-flowered, broad; empty glumes rather broad, about equal, obtuse or acuminate; lemma somewhat indurated, convolute, bearing a terminal deciduous slender awn; palet rather large; grain free, tightly enclosed in the convolute lemma.

1. **Oryzopsis racemosa** (Sm.) Ricker. Black-fruited Mountain-rice. A glabrous grass with erect, tufted stems, 1½-3 ft. high, and a small panicle with nearly simple usually ascending branches. Empty glumes about equal, acute; lemma dark colored, acute, sparingly pubescent, with a long awn.

In rocky woods. July-Sept. Geauga, Summit, Erie, Greene, Highland.

48. **Stipa** L. Porcupine-grass.

Generally tall, tufted perennial grasses with convolute leaf-blades and loose terminal panicles. Spikelets 1-flowered, narrow; empty glumes narrow, acute or bristle-tipped; lemma convolute, rigid, with

a hairy callus at the base, terminating in a simple, strong persistent, bent, twisted awn; palet 2-nerved, small; grain narrow, free, tightly enclosed in the fruiting lemma.

1. **Stipa spàrtea** Trin. Porcupine-grass. A tall, slender grass with erect, simple stems, 2-4 ft. high, with involute leaf blades and loose, narrow panicles, finally long-exserted. Empty glumes acuminate into long, slender points, glabrous; lemma brownish, appressed-pubescent below with a long, rigid, scabrous, twisted, usually bent awn; callus acuminate, very sharp-pointed, densely clothed with silky, appressed hairs. The awns are highly hygrometric, and the sharp-pointed fruit is injurious to animals, by penetrating the skin.

On plains, prairies, and sandy places. June, July. Erie County, where it occurs on Cedar Point.

49. **Aristida** L. Triple-awn-grass.

Tufted annuals or perennials with narrow leaves and usually with loose, narrow panicles. Spikelets 1-flowered; empty glumes unequal, narrow, acute or acuminate; lemma somewhat indurated, convolute, terminating in a three-branched awn; palet thin, 2-nerved; grain elongated, free, tightly enclosed in the lemma.

- | | | |
|---|---|-------------------------|
| 1. Awns separate to the base, not articulated to the lemma. | 2 | |
| 1. Awns united below into a long twisted neck and articulated to the lemma. | | <i>A. tuberculosa.</i> |
| 2. Lateral awns much shorter than the middle one. | 3 | |
| 2. Lateral awns not much shorter than the middle one. | 4 | <i>A. dichotoma.</i> |
| 3. Middle awn coiled at the base. | | <i>A. gracilis.</i> |
| 3. Middle awn not coiled at the base. | | <i>A. oligantha.</i> |
| 4. Outer empty glume 5-7-nerved; annuals. | | <i>A. purpurascens.</i> |
| 4. Outer empty glume 1-3 nerved; perennials. | | |

1. **Aristida dichótoma** Mx. Poverty-grass. An annual tufted grass with wiry much-branched stems, $\frac{1}{2}$ -2 ft. high, loose, glabrous sheaths, much shorter than the internodes, and narrow, simple, few-flowered, spike-like panicles, often reduced to racemes, the lateral ones often sessile and partly enclosed in the sheaths. Lemma with a horizontal awn, coiled at the base, with the two lateral awns erect and very short.

In dry sandy soil. Aug., Sept. Scioto, Vinton, Fairfield.

2. **Aristida oligántha** Mx. Few-flowered Triple-awn-grass. An annual, tufted grass with wiry, branched, erect, solid stems, loose sheaths, and few-flowered, lax, spike-like racemes or panicles. Empty glumes unequal, awned; lemma scabrous above with three nearly equal, divergent awns.

In dry sterile soil. Aug., Sept. Cuyahoga County.

3. **Aristida grácilis** Ell. Slender Triple-awn-grass. A glabrous annual grass with slender, sparingly branched stems, $\frac{1}{2}$ -2 ft. high, in small tufts or solitary, with rather close sheaths, and with a spike-like, slender panicle or raceme. Lemma usually mottled, with a horizontal middle awn and two much shorter, erect, lateral awns.

In dry sandy soil. Aug., Sept. Hamilton, Clermont, Athens, Erie, Cuyahoga.

4. **Aristida purpuráscens** Poir. Purplish Triple-awn-grass. A glabrous perennial grass, growing in small tufts, with erect, simple or sparingly branched stems, 1-2½ ft. high, and with a strict or sometimes nodding purplish panicle with appressed branches. Lemma with a horizontal middle awn and two somewhat shorter erect or divergent lateral awns.

In dry sandy or gravelly soil. Sept., Oct. Wood, Fulton.

Tribe, **Phalarideae**. Canary-grass Tribe.

Grasses with laterally compressed spikelets jointed above the empty glumes, arranged in panicles or racemes; spikelets with one perfect flower and 2 staminate or vestigial flowers below, the vestiges sometimes reduced to mere scale-like or bristle-like lemmas or obsolete.

50. **Savastàna** Schrank. Vanilla-grass.

Fragrant perennial grasses with flat leaves and terminal panicles. Spikelets 3-flowered, the terminal flower bisporangiate, the others staminate or vestigial; empty glumes subequal, acute, glabrous, and shining; lemmas of the staminate flowers boat-shaped, indurated, and hairy, each enclosing a 2-nerved palet and 3 stamens; lemma of the perfect flower similar but enclosing a 1-nerved palet and 2 stamens; grain free, enclosed in the flowering glumes.

1. **Savastana odoràta** (L.) Scrib. Vanilla-grass. A glabrous grass with simple erect stems, 1-2 ft. high, from a creeping rhizome, and with a pyramidal, usually compact panicle with slender drooping branches. Spikelets brownish; staminate lemmas hispid-ciliate on the margins and below the apex on the keel, awnless; fertile lemma hairy at the apex.

This sweet-scented grass is often strewn before churches in northern Europe, whence it is often called holy-grass. In moist meadows. May-July. Trumbull, Madison, Pickaway.

51. **Phálaris** L. Canary-grass.

Annuals or perennials with flat leaves and dense spike-like or capitate panicles. Spikelets 1-flowered, laterally flattened; empty glumes equal, boat-shaped, strongly compressed and usually wing-keeled; sterile lemmas minute; fertile lemma indurated and shining; palet faintly 2-nerved; grain oblong, free, enclosed in the flowering glumes.

1. Empty glumes not winged on the back; panicle narrow, branched.

1. Empty glumes broadly wing-keeled on the back; panicle very dense, appearing like a short spike. *P. arundinacea.*
P. canariensis.

1. **Phalaris arundinàcea** L. Reed Canary-grass. A glabrous perennial with simple erect stems, 2-5 ft. high, and a dense panicle with erect or slightly spreading branches. Spikelets lanceolate; sterile lemmas reduced to minute hairy scales; fertile lemma char-

taceous with long appressed silky hairs. The common ribbon-grass of gardens is the variety *picta* L.

In moist or wet soil. June-Aug. Rather general; no specimens from the northwestern nor from the southeastern counties.

2. ***Phalaris canariensis* L.** Canary-grass. An annual grass with erect simple or branched stems, 1-3 ft. high, and an ovoid or oblong head-like panicle. Spikelets broadly obovate, imbricated; empty glumes white with green veins; empty lemmas thin-membranous, sparingly hairy; fertile lemma brown, acute, with appressed silky hairs.

This species furnishes the canary seed of commerce. In waste places and roadsides. July, Aug. Cuyahoga, Montgomery, Hamilton. From Europe.

52. ***Anthoxanthum* L.** Vernal-grass.

Fragrant annual or perennial grasses with flat leaves and narrow spike-like panicles. Spikelets 1-flowered, narrow, somewhat compressed; empty glumes very unequal, acute or short-awned; sterile lemmas 2-lobed, awned on the back; fertile lemma, truncate, awnless; palea faintly 1-nerved; stamens 2; grain free, enclosed in the flowering glumes.

1. Empty glumes pubescent; panicle $1\frac{1}{2}$ -3 in. long; perennial.

A. odoratum.

1. Empty glumes glabrous; panicle $\frac{1}{2}$ - $1\frac{1}{2}$ in. long; annual.

A. puelii.

1. ***Anthoxanthum odoratum* L.** Sweet Vernal-grass. A perennial grass with simple or branched erect stems, 1-2 ft. high, and spike-like panicles, the short branches erect or ascending. Spikelets brownish green, spreading at flowering-time; empty glumes sparsely pilose; first sterile lemma short-awned below the apex the second bearing a strong bent awn near its base; fertile lemma awnless.

In fields, pastures and waste places. May-July. Ashtabula, Cuyahoga, Summit, Mahoning, Wayne, Franklin. From Europe.

2. ***Anthoxanthum puelii* Lecoq & Lamotte.** Long-awned Vernal-grass. An annual grass with slender stems often branching above the base, and with a dense spike-like panicle. Spikelets whitish green; empty glumes glabrous; first sterile lemma with an awn twice as long as its body, pubescent below the middle, the second sterile lemma with an awn 2-4 times the length of its body, also pubescent below; fertile lemma awnless.

In waste places. May-Aug. Hamilton County. A native of Europe.

Subfamily, **Panicatae.**Tribe, **Panicaceae.** Panic-grass Tribe.

Grasses having the 2-flowered spikelets rounded or dorsally compressed, jointed below the empty glumes, and arranged in racemes or panicles; lower flower staminate, vestigial or entirely absent; empty glumes membranous; flowering glumes of the perfect flower usually awnless, indurated, firmly enclosing the free grain.

53. **Panicum** L. Panic-grass.

Annual or perennial grasses of various habit with the spikelets in panicles. Spikelets 2-flowered, with 1 perfect flower and with a staminate or vestigial one below; empty glumes very unequal, the outer often minute; sterile lemma membranous often enclosing a hyaline palet; fertile lemma and palet indurated in fruit, margins of the lemma thick and inrolled; grain free, enclosed in the hardened flowering glumes.

1. Basal leaves like those of the stem. 2
1. Basal leaves unlike those of the stem. 10
2. Basal leaf-sheaths compressed, often keeled. 3
2. Basal leaf-sheaths round, little flattened, never keeled. 4
3. Fruit stipitate; spikelets conspicuously secund. *P. stipitatum.*
3. Fruit not stipitate; spikelets not conspicuously secund. *P. agrostoides.*
4. Leaf-sheaths smooth. 5
4. Leaf-sheaths pubescent; annuals. 6
5. Outer empty glume about $\frac{1}{2}$ as long as the spikelet; tall perennials with rhizomes. *P. virgatum.*
5. Outer empty glume about $\frac{1}{4}$ as long as the spikelet; annuals. *P. dichotomiflorum.*
6. Spikelets ovate, more than $\frac{1}{8}$ in. long; spikelets close. *P. miliaceum.*
6. Spikelets lanceolate or elliptic, less than $\frac{1}{8}$ in. long; spikelets distant. 7
7. Panicle narrow, the branches ascending; spikelets less than $\frac{1}{8}$ in. long. *P. flexile.*
7. Panicle spreading when mature; spikelet $\frac{1}{8}$ in. long or less. 8
8. Panicle very large, usually $\frac{1}{2}$ the length of the plant. *P. capillare.*
8. Panicle of medium size, usually $\frac{1}{3}$ the length of the plant. 9
9. Stem delicate; leaf-blade less than $\frac{1}{4}$ in. wide. *P. philadelphicum.*
9. Stem stout; leaf-blade usually $\frac{1}{4}$ - $\frac{3}{8}$ in. wide. *P. gattereri.*
10. Leaf-blades $\frac{1}{2}$ way up the stem less than $\frac{1}{2}$ in. wide, attenuate to cordate at the base. 11
10. Leaf-blades $\frac{1}{2}$ way up the stem $\frac{1}{2}$ in. or more wide, usually cordate clasping at the base. 30
11. Spikelets $\frac{1}{8}$ in. long or more. 12
11. Spikelets less than $\frac{1}{8}$ in. long, usually about $\frac{1}{8}$ in. 22
12. Leaves less than $\frac{1}{8}$ in. wide and about 18 times as long as wide. *P. depauperatum.*
12. Leaves more than $\frac{1}{4}$ in. wide, and not elongated. 13
13. Upper surface of the leaves glabrous. 14
13. Upper surface of the leaves pubescent. *P. leibergii.*

14. Outer empty glume $\frac{1}{3}$ as long as the spikelet, short acute. *P. scribnerianum*.
14. Outer empty glume $\frac{1}{2}$ as long as the spikelet, long acuminate. *P. xanthophysum*.
15. Stem simple or with basal branches only. 16
15. Stem at length fasciately branched. 22
16. Hairs on the leaf sheath almost $\frac{1}{8}$ in. long or longer, spreading, usually dense. *P. linearifolium*.
16. No hairs on the leaf sheath, or with hairs less than $\frac{1}{8}$ in. long, sometimes ciliate on the margin. 17
17. Leaf blade $\frac{1}{8}$ in. or less wide, usually 18 or more times as long as wide; spikelets usually glabrous. 18
17. Leaf-blade usually much more than $\frac{1}{4}$ in. wide, never more than 8 times longer than wide; spikelets more or less pubescent. 20.
18. Leaves much elongated; often 6 to 10 in. long, attenuate at the base. *P. wernerii*.
18. Leaves not elongated; generally less than $3\frac{1}{2}$ in. long, not attenuate at the base, spikelet less than $\frac{1}{8}$ in. long. *P. bicknellii*.
19. Spikelets roundish, not over $\frac{1}{8}$ in. long. 20
19. Spikelets oblong-elliptic or elliptic, usually $\frac{1}{8}$ in. or more long. 21
20. Nodes pubescent with appressed hairs, base of the leaves ciliate, panicle nearly as wide as long. *P. sphaerocarpon*.
20. Nodes glabrous, base of the leaves not ciliate; panicle not more than $\frac{1}{2}$ as wide as long. *P. polyanthes*.
21. Stems pubescent. *P. tsugetorum*.
21. Stems glabrous. *P. boreale*.
22. Spikelets glabrous. 23
22. Spikelets pubescent. 24
23. Nodes densely bearded. *P. microcarpon*.
23. Nodes not bearded. *P. dichotomum*.
24. Ligule at the top of the leaf sheath minute or absent. 25
24. Ligule present. 26
25. Nodes of the main stem glabrous or with a few hairs. *P. boreale*.
25. Nodes of the main stem pubescent. *P. ashei*.
26. Upper sheaths glabrous, ciliate on the margin. *P. lindheimeri*.
26. All of the sheaths pubescent. 27
27. Upper surface of the leaves glabrous, except for a few long hairs near the base. *P. tsugetorum*.
27. Upper surface of the leaves pilose. 28
28. Outer empty glume acute; spikelet $\frac{1}{8}$ in. long, pubescence on the sheath more than $\frac{1}{8}$ in. long. *P. villosissimum*.
28. Outer empty glume blunt; spikelet less than $\frac{1}{8}$ in. long; pubescence on the sheaths not so dense and less than $\frac{1}{8}$ in. long. 29
29. Upper surface of the leaf-blade long-pilose; plants yellowish-green. *P. huachucae*.
29. Upper surface of the leaf-blade long appressed pubescent. *P. implicatum*.
30. Spikelet $\frac{1}{8}$ in. or more long. 32
30. Spikelet less than $\frac{1}{8}$ in. long. 31
31. Spikelet less than $\frac{1}{8}$ in. long. *P. polyanthes*.
31. Spikelet more than $\frac{1}{8}$ in. long. *P. commutatum*.
32. Leaf sheaths mostly papillose-hispid; nodes glabrous or short pubescent. *P. clandestinum*.
32. Leaf-sheaths glabrous or soft-pubescent. 33
33. Nodes glabrous. *P. latifolium*.
33. At least the lower nodes pubescent or bearded. 34
34. Panicle narrow, its branches appressed, rarely a little spreading; upper nodes at least not bearded. *P. xanthophysum*.
34. Panicle open, its branches spreading; the nodes appressed-pubescent. *P. bosci*.

1. **Panicum agrostoides** Spreng. Agrostis-like Panic-grass. An erect, rather stout, glabrous perennial, 1-3½ ft. high, with loose sheaths and a purplish, oblong-ovate panicle, 6-12 in. long, the branches stiffly ascending. Spikelets crowded on sparsely hairy, short pedicels; lemma oval.

In wet ground and along shores. July-Sept. Portage, Erie.

2. **Panicum stipitatum** Nash. Long Panic-grass. A branched, erect perennial with compressed stems, 3-5 ft. high, and leaf-blades 1 ft. or more long, often purplish and scabrous. Inflorescence a pyramidal, purplish panicle; spikelets secund, acuminate, crowded; lemma narrowly elliptic and raised on a delicate stalk.

In moist soil. July-Sept. Northeastern Ohio to Lorain, Fairfield and Columbiana Counties.

3. **Panicum virgatum** L. Tall Smooth Panic-grass. A tall glabrous perennial grass, 3-7¾ ft. high, with creeping rhizomes, and loose panicles with ascending or spreading branches. Spikelets ovate, acute to acuminate; outer empty glume about one-half as long as the spikelet; first lemma usually subtending a palet and staminate flower. Second lemma shining, inclosing a perfect flower. An important grass.

It makes fair hay when cut young. In dry or moist soil, especially in prairies. Aug., Sept. General.

4. **Panicum dichotomiflorum** Mx. Spreading Panic-grass. A glabrous branching annual grass with compressed decumbent and geniculate stems, 4-6 ft. long, and a diffuse pyramidal panicle with the lower branches at length widely spreading. Spikelets crowded, lanceolate, acute, glabrous, sometimes purplish; outer empty glume one-fourth as long as the spikelet; fertile lemma elliptic, shining.

A weed. Cattle and horses are very fond of it. In wet soil and cultivated fields. July-Sept. General.

5. **Panicum miliaceum** L. Millet Panic-grass. An erect or decumbent annual grass with rather stout stems, 1-2 ft. high, and a dense panicle drooping at maturity. Sheaths papillose-hirsute. Spikelets ovoid, acuminate, turgid; outer empty glume ⅓ as long as the spikelet.

In waste places. A good fodder grass. Sometimes cultivated as a cereal. July-Sept. Lawrence, Richland, Erie. Introduced from Europe.

6. **Panicum capillare** L. Tumble Panic-grass. A stout sparingly branched, erect or decumbent annual, 1-5½ ft. high, with papillose-hirsute sheaths and a very large diffuse panicle with capillary branches, at first included in the sheath but later becoming exerted and finally breaking off at maturity as a tumble grass. Spikelets acute; outer empty glume ¼-½ as long as the spikelet.

A bad weed. In dry soil and cultivated fields. July-Sept. General and abundant.

7. **Panicum gattíngeri** Nash. Gattinger's Panic-grass. An annual grass with widely spreading or decumbent stems, sometimes forming mats, branching at all the nodes, 1-2 ft. long, and with numerous exserted oval panicles, smaller and less diffuse than in *P. capillare*. Sheaths hirsute; spikelets elliptic, acute, glabrous, very turgid.

In moist open ground. Aug.-Oct. Rather general.

8. **Panicum fléxile** (Gatt.) Scrib. Wiry Panic-grass. A slender erect annual grass, $\frac{1}{2}$ -2 ft. high with a few erect branches from the base and with a narrowly oblong panicle with ascending branches, usually one-half the length of the entire plant. Spikelets acuminate, solitary at the ends of the branchlets; outer empty glume $\frac{1}{4}$ as long as the spikelet.

In moist or dry sandy soil. Aug.-Oct. Adams, Champaign, Madison, Franklin, Erie, Cuyahoga.

9. **Panicum philadélphicum** Bernh. Philadelphia Panic-grass. A slender, erect or ascending, freely branching annual with zigzag stems, 1-2 ft. long, and a rather few-flowered panicle about $\frac{1}{3}$ the length of the plant. Spikelets elliptic, acute, smooth, usually in 2's at the ends of the divergent branchlets; outer empty glume about $\frac{1}{3}$ the length of the spikelet.

In dry woods and thickets. Aug., Sept. Trumbull, Ottawa.

10. **Panicum depauperàtum** Muhl. Starved Panic-grass. An erect or ascending perennial $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high, with erect elongated leaves, and a few-flowered, much exserted, terminal panicle, the lower panicles on very short basal branches. Spikelets glabrous, acute; outer empty glume $\frac{1}{3}$ the length of the spikelet.

In dry soil. June-Sept. Cuyahoga County.

11. **Panicum linearifòlium** Scrib. Linear-leaf Panic-grass. A densely tufted perennial grass with slender erect stems, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high, and a rather few-flowered, loose panicle. Spikelets obtuse or acutish, pubescent with spreading hairs; outer empty glume $\frac{1}{4}$ - $\frac{1}{3}$ as long as the spikelet.

In woods and hillsides. May-July. Rather general.

12. **Panicum wérneri** Scrib. Werner's Panic-grass. A smooth, light green, tufted, sparingly branched or simple perennial grass, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high, with erect, linear, acuminate leaves and a loose open panicle, which is finally long-exserted. Spikelets oval, somewhat pubescent; outer empty glume $\frac{1}{4}$ as long as the spikelet.

In dry woods, fields, and the drier parts of swamps. June, July. Lake, Cuyahoga, Franklin, Athens.

13. **Panicum bicknellii** Nash. Bicknell's Panic-grass. A slender, usually stiff, erect or decumbent perennial grass, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high, with the lower sheaths pubescent and a few-flowered panicle with stiff, slender branches. Spikelets oval or ovate, pubescent with ascending hairs; outer empty glume $\frac{1}{3}$ the length of the spikelet.

On dry, wooded hills. July, Aug. Gallia County.

14. **Panicum sphaerocarpon** Ell. Round-fruited Panic-grass. A dull green, usually erect, simple or somewhat branched perennial, $\frac{1}{2}$ -2 ft. high, with somewhat pubescent nodes and an ovoid, long-exserted, loosely flowered panicle with viscid spots on the axis and ascending branches. Spikelets nearly spherical, obtuse, usually purple; outer empty glume broadly ovate, very short.

In dry or sandy soil. July-Sept. Cuyahoga, Summit, Trumbull, Hocking, Scioto.

15. **Panicum polyántes** Schultes. Many-flowered Panic-grass. A light green perennial grass with erect, simple stems, 1-3 ft. high, with glabrous nodes and very long sheaths with finely ciliate margins, and with a densely flowered, elliptic panicle with slender ascending branches. Spikelets obovoid or nearly spherical; outer empty glume minute.

In damp ground and woods. July-Sept. Fairfield, Hocking, Jackson.

16. **Panicum dichótomum** L. Forked Panic-grass. A glabrous, often purplish, perennial grass with erect, dichotomously branched stems, $\frac{1}{2}$ -2 ft. high, from short, knotted rhizomes, with light green to purplish leaves, and with a much exserted terminal panicle with lax spreading branches and few spikelets. Spikelets usually glabrous, ellipsoid; outer empty glume minute.

In woodlands and thickets. May-Aug. Rather general; no specimens from the northwestern counties.

17. **Panicum microcarpon** Muhl. Small-fruited Panic-grass. A perennial grass, at first erect but later with densely branched, spreading or prostrate stems, 2-3 ft. long, strongly barbed on the nodes, and with a long-exserted, rigid primary panicle and small few-flowered secondary panicles. Spikelets purplish, glabrous; outer empty glume $\frac{1}{3}$ as long as the spikelet.

In moist soil and swampy places. June-Aug. Cuyahoga, Lorain, Erie, Fairfield, Hocking, Jackson, Adams.

18. **Panicum boreale** Nash. Northern Panic-grass. An erect or decumbent, somewhat branched perennial, 1-2 ft. high, with a narrow, loosely flowered panicle, the slender branches ascending or spreading. Spikelets ellipsoid, pubescent; outer empty glume minute.

In moist, open ground or woods. June, July. Fulton County.

19. ***Panicum lindheimeri*** Nash. Lindheimer's Panic-grass. An erect or spreading dichotomously branched perennial grass 1-1½ ft. high, with swollen nodes and a loosely flowered panicle with ascending or spreading branches, the primary one long-exserted. Spikelets pubescent, obovoid; outer empty glume minute.

In dry sandy woods and open ground. June-Aug. Ashtabula, Hocking.

20. ***Panicum huachucae*** Ashe. Hairy Panic-grass. A profusely branched erect or somewhat decumbent, hairy perennial grass, ½-1½ ft. high, with a rather densely flowered, ovoid panicle with ascending or spreading branches. Spikelets pubescent; outer empty glume minute.

In dry soil and on prairies. June-Sept. General.

21. ***Panicum villosissimum*** Nash. Villous Panic-grass. A villous, olive-green perennial grass with tufted, at length branched, erect or ascending stems, 1-2 ft. high, and a loosely flowered, long-exserted primary panicle. Spikelets obovate to elliptic, densely pubescent with short spreading hairs; outer empty glume a little less than ½ as long as the spikelet.

In dry sandy soil and open woods. June-Aug. Cuyahoga, Erie, Licking.

22. ***Panicum implicatum*** Scrib. Slender-stemmed Panic-grass. A slender, tufted, more or less pubescent, at length much branched perennial, ½-2 ft. high, with densely papillose-hirsute sheaths and an open, ovate panicle with widely spreading flexuous branches. Spikelets obovoid, obtuse, papillose-pilose; outer empty glume almost ½ as long as the spikelet.

In wet soil. July-Sept. Gallia County.

23. ***Panicum tsugetorum*** Nash. Hemlock Panic-grass. A bluish-green or sometimes purplish perennial with slender, tufted, branched, decumbent or prostrate stems, ½-1½ ft. long, and a rather loosely flowered panicle with ascending or spreading branches. Spikelets broadly ovate, pubescent; outer empty glume ⅓ as long as the spikelet.

In sandy woods. June-Sept. Defiance, Summit.

24. ***Panicum leibergii*** (Vasey) Scrib. Leiberg's Panic-grass. A pubescent perennial grass, 1-2½ ft. high, with slender, erect, and at length branched stems, with papillose-hispid sheaths and an oblong panicle with erect or ascending branches. Spikelets oval, papillose-hirsute, outer empty glume ½ the length of the spikelet.

On prairies and dry soil. June, July. No specimens.

25. ***Panicum scribnerianum*** Nash. Scribner's Panic-grass. An erect perennial with simple or dichotomously branched stems, ½-2

ft. high, and a small, ovoid, short-exserted panicle. Spikelets obtuse, very turgid, slightly pubescent; outer empty glume minute.

In dry or moist sandy soil or on dry prairies. June-Aug. Cuyahoga, Erie, Wood, Franklin.

26. **Panicum xanthophyllum** Gr. Slender Panic-grass. A tufted, yellowish green perennial grass with simple, erect or ascending stems, 1-2 ft. high, and a few-flowered, very narrow, finally long-exserted panicle with erect branches. Spikelets broadly obovate, very turgid, usually pubescent; outer empty glume nearly $\frac{1}{2}$ as long as the spikelet.

In dry soil. June-Aug. Lake County.

27. **Panicum áshei** Pear. Ashe's Panic-grass. An erect, stiff, sparingly branched, purplish perennial grass, $\frac{1}{2}$ -1 $\frac{1}{2}$ ft. high, with a small panicle, its branches ascending. Spikelets elliptic, obtuse, purplish; outer empty glume minute.

In dry woods. May-Aug. Cuyahoga, Lake, Trumbull, Fairfield.

28. **Panicum commutatum** Schultes. Variable Panic-grass. An erect, rather slender, finally dichotomously branched perennial grass, 1-2 $\frac{1}{2}$ ft. high, with firm leaf-blades, cordate clasping at the base, and a lax panicle with spreading branches. Spikelets elliptic, obtuse; outer empty glume minute.

In dry woods and thickets. June-Aug. Lawrence, Gallia, Fairfield, Wayne.

29. **Panicum latifolium** L. Broad-leaf Panic-grass. An erect, nearly smooth perennial grass with simple or branched stems, 1-3 ft. high, with broad leaf-blades cordate clasping at the base, and a long-exserted panicle with ascending few-flowered branches. Spikelets ovate-elliptic, obtuse; outer empty glume about $\frac{1}{3}$ the length of the spikelet.

In rocky woods and on sand dunes. July, Aug. General.

30. **Panicum boscii** Poir. Bosc's Panic-grass. A glabrous or minutely pubescent perennial with erect, simple or somewhat dichotomously branched stems, 1-2 $\frac{1}{2}$ ft. high, with broad leaves and a slightly exserted panicle with few-flowered spreading or ascending branches. Spikelets ovate; outer empty glume nearly $\frac{1}{2}$ as long as the spikelet.

In woods. June-Aug. Warren, Adams, Jackson, Belmont.

The variety *P. boscii molle* (Vas.) Hitch. & Ch. is downy-pubescent thruout and usually not so tall. Reported from Hamilton, Lawrence, and Cuyahoga Counties.

31. **Panicum clandestinum** L. Hispid Panic-grass. An erect or ascending, rather stout perennial with at first simple but later much branched stems, 1 $\frac{1}{2}$ -4 ft. high, with broad cordate clasping, glabrous leaf-blades and rather long-exserted primary panicles with

ascending branches, the secondary panicles usually included in the sheaths. Spikelets elliptic, pubescent; outer empty glume $\frac{1}{3}$ as long as the spikelet.

In moist ground and thickets. June, July. General.

54. *Leptoloma* Chase. Witch-grass.

Tufted perennial grasses with flat leaves and very diffuse terminal panicles which break away at maturity and become tumble-grasses. Spikelets with 1 perfect flower, solitary on long capillary pedicels; outer empty glume very minute or wanting, inner empty glume 3-nerved, nearly as long as the 5-7-nerved sterile lemma; fertile lemma indurated, papillose, with hyaline margin not inrolled; lemma of similar texture; grain free, enclosed in the flowering glumes.

1. *Leptoloma cognatum* (Schultes) Chase. Fall Witch-grass. A perennial slender tufted grass with erect or decumbent stems, 1-2 ft. high, usually much branched at the base, and with a loose panicle bearded in the axils, the lower branches at first erect and included in the upper sheath but finally exerted and widely spreading. Spikelets lanceolate, acuminate, on capillary pedicels; lemma lanceolate.

In dry soil. July-Sept. From the West. Lake County.

55. *Syntherisma* Walt. Crab-grass.

Annual, mostly weedy grasses with branched stems, thin flat leaves, and an inflorescence of second, spike-like racemes which are digitate or approximate at the ends of the branches. Spikelets with 1 perfect flower and a vestige of a second one, lanceolate-elliptic, sessile or short pediceled; empty glumes 1-3 nerved, the outer sometimes obsolete; sterile lemma 5-nerved; fertile lemma chartaceous, its margins hyaline and not inrolled; palet of similar texture; grain free, enclosed in the flowering glumes.

1. Rachis of the raceme branches with the angles wingless; outer empty glume wanting or minute; raceme branches 2-5; stems erect. *S. filiforme*.
1. Rachis of the raceme branches with the lateral angles broadly winged; stems spreading. 2
2. Pedicels terete, glabrous or nearly so; outer empty glume wanting or minute; raceme branches 2-6. *S. ischaemum*.
2. Pedicels sharply 3-angled, the angles hispidulous; outer empty glume present, small, raceme branches 3-12. *S. sanguinale*

1. *Syntherisma filiforme* (L.) Nash. Slender Crab-grass. A slender usually tufted grass with erect stems, 1-4 ft. high, and a panicle of 1-5 spike-like racemes. Spikelets elliptic, pubescent; outer

empty glume usually obsolete, the inner one and the sterile lemma villous between the nerves with gland-tipped hairs; fertile lemma dark-brown, acute.

In dry sandy soil. July-Sept. No specimens.

2. **Syntherisma ischaëmum** (Schreb.) Nash. Small Crab-grass. A glabrous grass with spreading or decumbent much-branched stems, $\frac{1}{2}$ -2 ft. long, and a panicle of 2-6 aggregated spike-like racemes. Inner empty glume and sterile lemma densely short-villous between the nerves; fertile lemma dark-brown.

In cultivated soil and waste places. July-Sept. Lorain, Wayne, Auglaize, Fairfield. From Europe.

3. **Syntherisma sanguinale** (L.) Dulac. Large Crab-grass. A grass with branched spreading stems, 1-5 ft. long, usually decumbent at the base and often rooting at the lower nodes. Panicles of 3-12 narrowly linear, spike-like racemes, digitate or approximate in whorls; spikelets elliptic-lanceolate, acute; outer empty glume usually present, minute; fertile lemma pale or grayish.

In cultivated and waste ground. A very troublesome weed. Makes good hay and pasturage. July-Sept. General. Naturalized from Europe.

56. **Echinóchloa** Beauv. Barnyard-grass.

Usually coarse annual grasses with long broad leaf-blades, compressed sheaths, and terminal panicles of stout one-sided racemose branches. Spikelets with 1 perfect terminal flower and a staminate or vestigial one below; empty glumes unequal, spiny hispid on the nerves, mucronate; sterile lemma similar, usually awned from the apex, its palet hyaline; fertile lemma and palet chartaceous, acuminate; margin of the lemma inrolled; grain free, enclosed in the flowering glumes.

1. Leaf sheaths glabrous; second and third glumes more or less awned.

E. crus-galli.

1. Leaf sheaths, at least the lower ones densely papillose-hirsute; second and third glumes long-awned.

E. walteri.

1. **Echinochloa crus-galli** (L.) Beauv. Common Barnyard-grass. A rather succulent grass branching from the base, with ascending or erect stems, 2-7 $\frac{1}{3}$ ft. long, and a dense panicle of numerous erect or spreading, or sometimes reflexed branches. Spikelets ovate, green or purple, densely crowded in rows on one side of the rachis; empty lemma more or less awned; fertile lemma ovate, abruptly pointed.

A common weed. Sometimes cultivated for hay. A variety is sometimes advertised as "Billion Dollar Grass." In cultivated and especially in manured soil and waste places. Aug.-Oct. General and abundant. Naturalized from Europe.

2. **Echinochloa walteri** (Pursh.) Nash. Marsh Cockspur-grass. A grass with robust more or less succulent stems, 3-6 ft. long, and a long more or less drooping panicle with compact ascending or spreading branches. Spikelets long-awned, ovate-lanceolate, on one side of the rachis, brownish-purple; inner empty glume and empty lemma awned; fertile lemma, ovate-lanceolate, acuminate.

In marshes and ditches. Aug.-Oct. Erie, Lorain, Shelby, Auglaize, Licking.

57. **Páspalum** L. Paspalum.

Perennial grasses of various habit with the spikelets in spike-like, one-sided racemes, digitate or racemose at the tip of the main stem or branches. Spikelets with 1 perfect flower and a vestige, plano-convex, nearly sessile, placed with the back of the fertile lemma toward the rachis; empty glumes very unequal or the outer entirely obsolete; lemma and palea indurated, margins of the lemma inrolled; grain free, enclosed in the flowering glumes.

1. Rachis of the racemes very broad, membranous with inrolled margins, about twice the width of the spikelets; rachis not extending beyond the spikelets. *P. dissectum.*
1. Rachis narrower than the spikelets not inrolled on the margins. 2
2. Stems simple, axillary peduncles none; racemes stout; sheaths glabrous or nearly so. *P. laeve.*
2. Stems branched, the upper sheaths containing from 1-3 branches; racemes slender. 3
3. Spikelets somewhat pubescent, $\frac{1}{8}$ in. long. *P. setaceum.*
3. Spikelets glabrous, nearly $\frac{1}{8}$ in. long. *P. muhlenbergii.*

1. **Paspalum setaceum** Mx. Slender Paspalum. A slender grass with erect or ascending stems, $\frac{1}{2}$ -2 $\frac{1}{2}$ ft. high, and with an inflorescence of 1-2 spike-like racemes. Spikelets ovate, somewhat pubescent, about $\frac{1}{16}$ in. long; one of the empty glumes 3-nerved, the other 2-nerved.

In dry fields. Aug.-Oct. Cuyahoga County.

2. **Paspalum muhlenbergii** Nash. Muhlenberg's Paspalum. A tufted branching pubescent perennial grass with spreading or reclining stems, 1-2 $\frac{1}{2}$ ft. long, and an inflorescence of 1-2 spike-like racemes. Spikelets glabrous, oval or broadly obovate, in pairs; lemma with inrolled margins; empty glumes usually 3-nerved.

In fields and sandy soil. Aug.-Oct. Cuyahoga, Erie, Warren, Hamilton, Scioto, Guernsey.

58. **Chaetochloa** Scrib. Foxtail-grass.

Annual or perennial grasses usually with erect stems and flat leaf blades, the inflorescence in spike-like panicles containing numerous persistent awn-like bristles on the rachis below the articu-

lation of the spikelets. Spikelet 2-flowered, one perfect, the other vestigial or rarely staminate; empty glumes very unequal; sterile lemma often enclosing a hyaline palet; fertile lemma and palet chartaceous or indurated in fruit; grain free enclosed in the flowering glumes.

1. Bristles of the inflorescence downwardly barbed; comparatively inconspicuous. *C. verticillata*.
1. Bristles upwardly barbed. 2
2. Bristles at the base of the spikelets 5-16, involucrate, yellowish-brown; inflorescence racemose; inner empty glume shorter than the spikelet. *C. glauca*.
2. Bristles at the base of the spikelet 1-3, not involucrate; inflorescence paniculate; inner empty glume as long as the spikelet. 3
3. Inflorescence 1-3½ in. long, ½ in. thick or less; bristles green. *C. viridis*.
3. Inflorescence 4-9 in. long, ½-2 in. thick; bristles usually purple. *C. italica*.

1. **Chaetochloa verticillata** (L.) Scrib. Verticillate Foxtail-grass. A tufted annual grass with more or less branched, erect or decumbent stems, 1-2 ft. high, and a dense spike-like green panicle which is somewhat compound and interrupted at the base. Involucral bristles of the inflorescence retrorsely barbed; outer empty glume 1-nerved, less than one-half as long as the spikelet; fertile lemma abruptly apiculate and obscurely transverse-rugose.

In waste places and yards. July-Sept. From Europe. Cuyahoga, Wayne, Jefferson, Franklin, Ross, Montgomery, Warren, Hamilton.

2. **Chaetochloa glauca** (L.) Scrib. Yellow Foxtail-grass. An annual grass with compressed, erect or ascending stems, branching at the base, 1-4 ft. high, with glaucous leaves, and a yellowish, compact, spike-like panicle. Involucral bristles upwardly barbed, yellowish-brown; spikelets oval, much shorter than the bristles; fertile lemma striate, undulate-rugose, very convex.

A weed. In cultivated fields and waste places. July-Sept. General. From Europe.

3. **Chaetochloa viridis** (L.) Scrib. Green Foxtail-grass. An annual tufted grass with simple or branched, erect or ascending stems, 1-5⅓ ft. high, and a rather thick spike-like green panicle with slender upwardly barbed greenish bristles. Spikelets elliptic, much shorter than the bristles; outer empty glume less than one-half as long as the spikelet; fertile lemma only moderately convex, obtuse, striate and faintly wrinkled.

Often a bad weed. In cultivated fields and waste places. July-Sept. General. Naturalized from Europe.

4. **Chaetochloa italica** (L.) Scrib. Italian Millet. An annual grass with erect stems, 2-5 ft. high, and thick, compact, compound, nodding panicles, interrupted at the base. Involucral bristles upwardly barbed, usually purplish; spikelets elliptic, shorter than the

bristles; outer empty glume less than one-half as long as the spikelet; fertile lemma only moderately convex, striate, finely and faintly transverse-rugose or pitted.

Several varieties are extensively cultivated for hay. If fed in large quantities and too frequently, the hay is injurious to horses. In cultivated fields and waste places. Also called German or Hungarian millet. July-Sept. Rather general. Escaped from cultivation.

Pennisetum glaucum (L.) R. Br. Pearl-millet. A coarse annual grass, with a solid stem, 3-8 ft. high, bearing cylindrical, spike-like panicles, 6-12 in. long. Spikelets with 1 perfect flower and an additional vestigial lemma, surrounded at the base by a cluster of bristles. Empty glumes small and hyaline. Cultivated for fodder and for the grain which is used as food. Other related species are cultivated as ornamental grasses.

59. *Cenchrus* L. Sandbur-grass.

Annual or perennial grasses with flat leaves and spikate inflorescence, the small clusters of spikelets covered by a prickly, bur-like involucre which is deciduous with them at maturity. Prickles retrorsely barbed. Involucres with 2 or more spikelets. Spikelets 2-flowered usually with one perfect flower and a second staminate or vestigial flower; empty glumes shorter than the lemmas, unequal; lemma and palea of the perfect flower chartaceous, the lemma not inrolled at the margins; grain free, inclosed in the glumes and the prickly involucre.

Cenchrus tribuloides L. Sandbur-grass. An annual ascending or trailing grass with flattened, much-branched solid stems, $\frac{1}{2}$ -3 ft. long, and a stout spike-like raceme of prickly burs, often partly enclosed in the upper leaf sheath. Prickly involucre pubescent, the prickles retrorsely barbed; spikelets enclosed in the involucre; fertile lemma not inrolled at the margin; somewhat indurated.

A disagreeable, troublesome weed. In sandy soil and cultivated fields. July-Sept. Lucas, Wood, Ottawa, Erie, Lorain, Cuyahoga, Franklin, Highland, Gallia.

Tribe, **Oryzeae.** Rice Tribe.

Grasses with monosporangiate or bisporangiate, more or less laterally compressed spikelets in loose panicles; rachilla articulated below the empty glumes which are often minute or obsolete; stamens often 6; hilum linear.

60. **Homalocénchrus** Mieg. Cut-grass.

Perennial marsh grasses with flat narrow rough and cutting leaf-blades and with paniculate inflorescence. Spikelets apparently 1-flowered, strongly flattened laterally, those of the open part of the panicle usually sterile, those inclosed in the sheath cleistogamous and fruitful; empty glumes none; flowering glumes boat-shaped, somewhat indurated, awnless; stamens 1-6; grain ovoid, free.

1. Branches of the rather simple panicle stiffly spreading; spikelets $\frac{1}{8}$ in. long or less. *H. virginicus.*
1. Branches of the diffuse panicle generally lax; spikelets $\frac{1}{8}$ - $\frac{1}{4}$ in. long. *H. oryzoides.*

1. **Homalocenchrus virginicus** (Willd.) Britt. Virginia Cut-grass. A grass with branched, weak, ascending stems, 1-3 ft. long, with clustered scaly rhizomes, and with simple panicles finally long-exserted, the slender branches stiffly spreading and usually naked below the middle. Lateral panicles usually included; spikelets oblong, appressed; lemma hispid on the keel; stamens 2.

In swamps and wet woods. Aug., Sept. Rather general.

2. **Homalocenchrus oryzoides** (L.) Poll. Rice Cut-grass. A grass with rather stout, branching stems, 1-4 ft. long, ascending from a decumbent base with slender creeping rhizomes, with very rough leaves and a diffusely branched, lax panicle with ascending or spreading branches. Lateral panicles usually included. Spikelets elliptic; lemma hispid, strongly bristly ciliate on the keel.

In swamps and along ditches and streams. Aug., Sept. Rather general.

61. **Zizània** L. Wild-rice.

A tall monocious hydrophytic annual grass with long flat leaves and large terminal panicle, the upper part consisting of carpellate spikelets, the lower of staminate, with some perfect spikelets between the two regions. Spikelets on club-shaped pedicles, readily deciduous, apparently 1-flowered, probably consisting of 2 coalescent flowers; empty glumes membranous, very minute or nearly obsolete. Carpellate spikelet with a long-awned flowering glume and 6 vestigial

stamens; staminate spikelet with 6 stamens and a vestigial gynecium, its glumes short-awned or awn-pointed; spikelets between the staminate and carpellate parts of the inflorescence more or less perfect, with 6 stamens; grain cylindrical, closely enveloped in the flowering glumes.

1. **Zizania aquática** L. Wild Rice. A large annual grass with an erect stem, 3-10 ft. high, broad flat leaves, and a large loose panicle, the upper part carpellate with erect branches, the lower staminate with ascending or spreading branches. Staminate spikelets with acute awn-pointed glumes; carpellate spikelets linear, the lemma long-awned; staminate spikelet with 6 stamens and a vestigial ovulary; carpellate spikelet with 6 vestigial stamens.

The grain was used by the Indians for food. In swamps, often in rather deep water. July, Aug. Erie, Licking, Perry, Hocking.

Tribe, **Andropogoneae**. Beard-grass Tribe.

Grasses usually having the spikelets in pairs on the branches of the inflorescence, the one sessile and perfect, the other pediceled and perfect, staminate, or vestigial; often arranged in rows; empty glumes more or less indurated, the flowering glumes hyaline; lemma of the perfect flower usually awned; spikelets articulate below the empty glumes, dorsally compress or round.

62. **Holcus** L. Sorghum.

Annual or perennial grasses with solid stems, long broad flat leaves and large terminal panicles. Spikelets 1-flowered, in pairs at the nodes or in 3's at the ends, the one sessile and bisporangiate the other pedicellate and staminate or entirely vestigial; empty glumes of the sessile spikelet indurated and usually shining, obscurely nerved; flowering glumes hyaline, lemma awned, palea small or sometimes absent; grain free, more or less enclosed in the flowering glumes.

1. Panicle lax the branches with spikelets nearly to the base; stem usually not over $\frac{1}{4}$ in. thick; perennial. *H. halapense.*
1. Panicle large and compact or with very long branches naked below; stem usually $\frac{1}{2}$ -1 $\frac{1}{2}$ in. in diameter; annual. *H. sorghum.*

1. **Holcus halapensis** L. Johnson-grass. A coarse perennial grass with solid, simple or sometimes branched stems, 3-5 ft. high, and an open panicle, usually with whorled, spreading branches, naked toward the base. Sessile spikelet, ovate-lanceolate, usually purplish, pubescent with appressed hairs; awn of the fertile lemma more or less bent; pedicellate spikelets with membranous glumes, sometimes enclosing a staminate flower but usually vestigial.

Cultivated as a forage grass. Escaped. In cultivated fields and waste places. A troublesome weed in the South. July-Sept. Native of Europe. Cuyahoga, Erie, Franklin, Madison.

2. **Holcus sorghum** L. Common Sorghum. A coarse annual grass with thick solid stems, 5-12 ft. high, usually with rather dense, much-branched panicles, but in some varieties with the naked part of the branches greatly elongated. Sessile spikelets ovoid or elliptical, with a large usually exposed grain; pediceled spikelets vestigial.

Cultivated in many forms for fodder, grain, syrup, and broom-corn under various names as sorghum, durra, Kafir-corn, broom-corn, feterita, milo-maize, etc. July-Sept. Volunteer in Adams County.

Sudan-grass is an annual slender-stemmed grass, 4-10 ft. high, recently introduced as a forage crop. It is without rhizomes and is apparently a variety of the common sorghum.

63. *Sorghastrum* Nash. Indian-grass.

Tall stout perennial grasses with hollow stems, long narrow flat leaves, and terminal open panicles. Spikelets in pairs, the sessile spikelet with 1 perfect flower, the pedicellate spikelet vestigial; empty glumes of the sessile spikelet indurated and shining, flowering glumes hyaline, the lemma usually awned; palet sometimes wanting; grain free.

1. *Sorghastrum nutans* (L.) Nash. Indian-grass. A large grass with simple, erect hollow stems, 3-8 ft. high, and a narrowly oblong panicle with slender, erect or spreading branches. Spikelets lanceolate, yellowish or reddish brown and shining, clothed especially toward the base with fawn-colored hairs, at length drooping; lemma with a twisted awn.

A valuable pasture and hay grass. In dry soil especially prairies. Aug., Sept. Ashtabula, Cuyahoga, Erie, Wyandot, Auglaize, Franklin, Madison, Adams.

Erianthus ravennae (L.) Beauv. Plume-grass. A robust perennial grass, with solid stems, 5-10 ft. high, with a plume-like, silky panicle, 1-2 ft. long. Spikelets with 1 perfect flower and a sterile lemma, in pairs, one sessile, the other pedicellate, with a ring of long hairs at the base. Cultivated for ornament.

64. *Miscanthus* Anderss. Plume-grass.

Tall erect perennials with flat leaves and ample terminal, commonly hairy panicles. Spikelets in pairs unequally pedicellate, with 1 perfect flower; empty glumes membranous, blunt at the apex; sterile lemma thinner; fertile lemma thinly hyaline, 2-toothed at the apex and awned; palet thin, hyaline; grain free.

1. *Miscanthus sinensis* Anderss. Chinese Plume-grass. A large perennial grass with stems 3-9 ft. high, with long, slender leaves and a panicle of numerous erect or ascending branches. Spikelets yellowish brown, surrounded at the base with long, white or purplish hairs; lemma hyaline with a spirally twisted awn arising from between the two teeth of the apex.

The variety with banded leaves is commonly cultivated for ornament in gardens and parks and occasionally escapes into waste places. Aug., Sept. An escape in Lake County.

65. *Andropogon* L. Beard-grass, Bluestem.

Tall usually tufted perennials with narrow leaves and terminal and axillary racemes consisting of spike-like branches often more or less digitately arranged and with long silky hairs on the rachis and pedicels. Spikelets in pairs at each node of the jointed rachis one sessile and bisporangiate, the other pedicellate and either stam-

inate or vestigial; empty glumes of the sessile spikelet subequal, indurated, the outer one dorsally flattened with a strong nerve near each margin, the inner one keeled above; first lemma hyaline; fertile lemma membranous or hyaline, awned, its palea hyaline, sometimes obsolete; grain free.

1. Inflorescence of 2 or more racemose branches; joints of the rachis not clavate. 2
1. Raceme simple; joints of the rachis clavate, with a cup-shaped depression at the top. *A. scoparius.*
2. Raceme branches 2-6 on a long peduncle; rachis with short inconspicuous hairs; tall coarse grasses. *A. furcatus.*
2. Raceme branches 2 or 3, subtended by a foliaceous sheath; rachis covered with long white hairs. *A. virginicus.*

1. **Andropogon furcatus** Muhl. Big Bluestem. A large grass with solid, robust stems simple at the base but branching from the upper nodes, 3-8½ ft. high, with a sweetish sap and with a more or less digitate panicle of 2-6 spike-like racemes, usually purplish. Rachis joints and pedicels hairy on the sides and at the summit; pedicellate spikelet staminate; sessile spikelet perfect; fertile lemma with a delicate awn.

A characteristic and important prairie grass valuable for hay and pasture. In dry or moist soil. Aug., Sept. Rather general.

2. **Andropogon virginicus** L. Virginia Beard-grass. A grass with rather slender stems sparingly branched above, 1½-4 ft. high, and with a loose and elongated inflorescence of 2-4 spike-like racemes protruding from the sides of the sheaths. Hairs of the inflorescence long and silky; sessile spikelet perfect, its lemma with a nearly straight awn; pedicellate spikelet vestigial.

In dry or moist open fields and hillsides. Aug., Sept. Gallia, Jackson, Meigs, Athens, Vinton, Hocking, Fairfield, Belmont.

3. **Andropogon scoparius** Mx. Little Bluestem. (*Schizachyrium scoparium* (Mx.) Nash.) A tufted grass with rather slender and stiff, simple or branched stems, 1-4½ ft. high, and with loose racemes on long-exserted, slender peduncles. Joints of the rachis and pedicels ciliate with spreading hairs; sessile spikelet perfect, the fertile lemma with a bent and twisted awn; pedicellate spikelet reduced to a single awn-pointed glume.

An important hay and forage grass in the West. On dry prairies and in sandy fields. Aug.-Oct. Rather general.

Tribe, **Maydeae.** Corn Tribe.

Monocious grasses having the staminate and carpellate spikelets in different inflorescences or in different parts of the same inflorescence, often with highly specialized structures; spikelets articulated below the empty glumes, round or dorsally compressed, in pairs, normally 2-flowered, some of the flowers usually more or less vestigial or obsolete and the staminate and carpellate flowers usually showing vestiges of the opposite organs.

66. **Tripsacum L.** Gama-grass.

Tall stout monocious perennials with solid stems, thick creeping rhizomes, broad flat leaves, and a panicle of spikeate or racemose branches, the joints of the fruiting rachis separating at the nodes, each joint containing a grain and the remains of the spikelet, the upper part of the inflorescence staminate, lower part carpellate. Staminate spikelets in pairs, the flowers containing vestigial ovularies; carpellate spikelet solitary imbedded in the rachis joint, with one carpellate flower which contains vestigial stamens and a vestigial flower with only a vestigial ovulary; outer empty glume of the carpellate flower large and cartilaginous, the inner coriaceous; flowering glumes hyaline; empty glumes of the staminate spikelets subcoriaceous, the flowering glumes membranous or hyaline; grain free enclosed in the pocket of the rachis joint and the glumes.

Tripsacum dactyloides L. Gama-grass. A monocious, perennial grass with thick rhizomes and solid stems, 1-7 ft. high. Inflorescence consisting of a number of spike-like racemes with paired staminate spikelets above and single carpellate spikelets below. Spikelets 2-flowered, the carpellate spikelet, with one carpellate and one vestigial flower, contained in the deeply channeled joints of the rachis which separate spontaneously at maturity, by cleavage planes.

Euchlaena mexicana Schrad. Teosinte. A monocious annual grass, 8-15 ft. high, of much value for forage in the south. The carpellate inflorescence is surrounded by a peculiar husk, and the grains are enclosed in the flattened rachis joints much as in *Tripsacum*.

67. **Coix L.** Job's-tears.

Coarse much-branched annuals with large broad leaves and a monocious inflorescence, the staminate spikelets covered by a modified leaf-sheath which becomes bony and bead-like in fruit, the staminate inflorescence projecting thru this sheath. Staminate spikelets 2-flowered, the flowers with vestigial ovularies; carpellate spikelets 2-flowered, the outer flower entirely vestigial with a lemma, the inner containing a normal gynecium and 3 vestigial stamens; two or more vestigial structures usually present in the sheath besides the carpellate spikelet; empty glumes thick-membranous; flowering glumes hyaline; grain free, enclosed in the glumes and the bony sheath.

1. **Coix lacryma-jobi L.** Job's-tears. A much-branched annual grass with rather thick stems, 2-4 ft. high, and a peculiar inflores-

cence, the carpellate spikelet covered by a hardening bead-like sheath, bluish-gray in color and shining when ripe, the staminate inflorescence small and projecting on a slender pedicel from the bead-like sheath.

Grown for the ornamental fruits which are used as beads and for rosaries. In waste places around gardens. July-Sept. Persistent in Franklin County.

68. *Zea* L. Indian-corn.

Tall coarse annual grasses with solid stems, large broad flat leaves, prominent prop roots, and a monocious inflorescence, the staminate spikelets in an ample panicle at the summit of the stem, and the carpellate spikelets on an ear covered with husks at the side of the main stem. Staminate and carpellate, spikelets sometimes in the same panicle. Staminate spikelets 2-flowered, in pairs, one sessile and the other pediceled; carpellate spikelets always in double rows on the ear, usually 2-flowered, the outer flower vestigial; style of the gynecium a very long "silk"; empty glumes thick-membranous or coriaceous; flowering glumes hyaline; grain large, free.

1. *Zea mays* L. Indian-corn. A tall, coarse, annual grass with broad leaves and a thick, solid, erect stem, 3-15 ft. high, developing prominent prop-roots at the basal joints, an ample staminate panicle at the top, and one or more peculiar, compact, carpellate inflorescences at the side, called ears, covered with peculiar leaf-sheaths or husks; grain large, exposed, with a very long style or silk.

Extensively cultivated in many varieties for grain, green corn, and fodder. Many products are made from the grain. The stigmas of the silk are used in medicine. In fields and waste places. June-Sept. Also called maize. Spontaneous in Brown, Adams, Scioto, Fayette, Monroe, Erie, and Hancock Counties.

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